INVERTER

A800

FR-A820-00046(0.4K)-04750(90K)
FR-A840-00023(0.4K)-06830(280K)

INSTRUCTION MANUAL (STARTUP) (ENGLISH)

—CONTENTS—

1 INVERTER INSTALLATION AND PRECAUTIONS 3
2 OUTLINE DIMENSIONS 4
3 WIRING 5
4 FAILSAFE SYSTEM WHICH USES THE INVERTER 13
5 PRECAUTIONS FOR USE OF THE INVERTER 14
6 DRIVE THE MOTOR 15
7 TROUBLESHOOTING 23
8 SPECIFICATIONS 25

This Instruction Manual (Startup) provides handling information and precautions for use of the equipment.
Please forward this Instruction Manual (Startup) to the end user.

Safety Instructions

Do not attempt to install, operate, maintain or inspect the product until you have read through this Instruction Manual (Startup) and appended documents carefully and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
Installation, operation, maintenance and inspection must be performed by qualified personnel. Here, qualified personnel means personnel who meets all the conditions below.

- **A person who took a proper engineering training. Such training may be available at your local Mitsubishi Electric office. Contact your local sales office for schedules and locations.**
- **A person who can access operating manuals for the protective devices (e.g. light curtain) connected to the safety control system. A person who has read and familiarized himself/herself with the manuals.**

In this Instruction Manual (Startup), the safety instruction levels are classified into "WARNING" and "CAUTION"

⚠Warning	**Incorrect handling may cause hazardous conditions, resulting in death or severe injury.**
⚠Caution	**Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.**

The ⚠Caution level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.

◆ Electric Shock Prevention

⚠Warning

- While the inverter power is ON, do not open the front cover or the wiring cover. Do not run the inverter with the front cover or the wiring cover removed. Otherwise you may access the exposed high voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is OFF, do not remove the front cover except for wiring or periodic inspection. You may accidentally touch the charged inverter circuits and get an electric shock.
- Before wiring or inspection, LED indication of the operation panel must be switched OFF. Any person who is involved in wiring or inspection shall wait for at least 10 minutes after the power supply has been switched OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- This inverter must be earthed (grounded). Earthing (grounding) must conform to the requirements of national and local safety regulations and electrical code (NEC section 250, IEC 536 class 1 and other applicable standards). A neutral-point earthed (grounded) power supply for 400 V class inverter in compliance with EN standard must be used.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The inverter must be installed before wiring. Otherwise you may get an electric shock or be injured.
- Setting dial and key operations must be performed with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress,heavy loads or pinching. Otherwise you may get an electric shock.
- Do not change the cooling fan while power is ON. It is dangerous to change the cooling fan while power is ON.
- Do not touch the printed circuit board or handle the cables with wet hands. Otherwise you may get an electric shock.
- When measuring the main circuit capacitor capacity, the DC voltage is applied to the motor for 1s at powering OFF. Never touch the motor terminal, etc. right after powering OFF to prevent an electric shock.
- An PM motor is a synchronous motor with high-performance magnets embedded in the rotor. Motor terminals holds high-voltage while the motor is running even after the inverter power is turned OFF. Before wiring or inspection, the motor must be confirmed to be stopped. In an application, such as fan and blower, where the motor is driven by the load, a low-voltage manual motor starter must be connected at the inverter's output side, and wiring and inspection must be performed while the motor starter is open. Otherwise you may get an electric shock.

◆ **Fire Prevention**

⚠ Caution

- Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heatsink on the rear side, etc.). Mounting it to or near flammable material may cause a fire.
- If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current may cause a fire.
- When using a brake resistor, a sequence that will turn OFF power when a fault signal is output must be configured. Otherwise the brake resistor may excessively overheat due to damage of the brake transistor and such, causing a fire.
- Do not connect a resistor directly to the DC terminals P/+ and N/-. Doing so could cause a fire.
- Be sure to perform daily and periodic inspections as specified in the Instruction Manual. If a product is used without any inspection, a burst, breakage, or a fire may occur.

◆ **Injury Prevention**

⚠ Caution

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- The polarity (+ and -) must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter as it will be extremely hot. Touching these devices may cause a burn.

◆ **Additional Instructions**

The following instructions must be also followed. If the product is handled incorrectly, it may cause unexpected fault, an injury, or an electric shock.

⚠ Caution

Transportation and Mounting

- Any person who is opening a package using a sharp object, such as a knife and cutter, must wear gloves to prevent injuries caused by the edge of the sharp object.
- The product must be transported in correct method that corresponds to the weight. Failure to do so may lead to injuries.
- Do not stand or rest heavy objects on the product.
- Do not stack the boxes containing inverters higher than the number recommended.
- When carrying the inverter, do not hold it by the front cover; it may fall off or fail.
- During installation, caution must be taken not to drop the inverter as doing so may cause injuries.
- The product must be installed on the surface that withstands the weight of the inverter.
- Do not install the product on a hot surface.
- The mounting orientation of the inverter must be correct.
- The inverter must be installed on a strong surface securely with screws so that it will not drop.
- Do not install or operate the inverter if it is damaged or has parts missing.
- Foreign conductive objects must be prevented from entering the inverter. That includes screws and metal fragments or other flammable substance such as oil.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- The surrounding air temperature for LD,ND (initial setting), and HD models must be between -10 and +50°C (non-freezing). The surrounding air temperature for SLD must be between -10 and +40°C (non-freezing). Otherwise the inverter may be damaged.
- The ambient humidity must be 95%RH or less (non-condensing). Otherwise the inverter may be damaged. (Refer to page 3 for details.)
- The storage temperature (applicable for a short time, e.g. during transit) must be between -20 and +65°C. Otherwise the inverter may be damaged.
- The inverter must be used indoors (without corrosive gas, flammable gas, oil mist, dust and dirt etc.) Otherwise the inverter may be damaged.
- The inverter must be used at an altitude within 2500 m or less above sea level, within 5.9 m/s^2 vibration at 10 to 55 Hz (directions of X, Y, Z axes). Otherwise the inverter may be damaged. (Refer to page 3 for details.)
- If halogen-based materials (fluorine, chlorine, bromine, iodine, etc.) infiltrate into a Mitsubishi product, the product will be damaged. Halogen-based materials are often included in fumigant, which is used to sterilize or disinfest wooden packages. When packaging, prevent residual fumigant components from being infiltrated into Mitsubishi products, or use an alternative sterilization or disinfection method (heat disinfection, etc.) for packaging. Sterilization of disinfection of wooden package should also be performed before packaging the product.
- To prevent a failure, do not use the inverter with a part or material containing halogen flame retardant including bromine.

Wiring

- Do not install a power factor correction capacitor or surge suppressor/ capacitor type filter on the inverter output side. These devices on the inverter output side may be overheated or burn out.
- The output side terminals (terminals U, V, and W) must be connected correctly. Otherwise the motor will rotate inversely.
- PM motor terminals (U, V, W) hold high-voltage while the PM motor is running even after the power is turned OFF. Before wiring, the PM motor must be confirmed to be stopped. Otherwise you may get an electric shock.
- Never connect an PM motor to the commercial power supply. Applying the commercial power supply to input terminals (U,V, W) of an PM motor will burn the PM motor. The PM motor must be connected with the output terminals (U, V, W) of the inverter.

⚠

Test run

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

⚠ Warning

Usage

- Everyone must stay away from the equipment when the retry function is set as it will restart suddenly after a trip.
- Since pressing STOP RESET key may not stop output depending on the function setting status, separate circuit and switch that make an emergency stop (power OFF, mechanical brake operation for emergency stop, etc.) must be provided.
- OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting inverter fault with the start signal ON restarts the motor suddenly.
- Do not use a PM motor for an application where the PM motor is driven by its load and runs at a speed higher than the maximum motor speed.
- Use this inverter only with three-phase induction motors or with a PM motor. Connection of any other electrical equipment to the inverter output may damage the equipment.
- Performing pre-excitation (LX signal and X13 signal) under torque control (Real sensorless vector control) may start the motor running at a low speed even when the start command (STF or STR) is not input. The motor may run also at a low speed when the speed limit value = 0 with a start command input. It must be confirmed that the motor running will not cause any safety problem before performing pre-excitation.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. Doing so may lead to fault or damage of the product.

⚠ Caution

Usage

- The electronic thermal relay function does not guarantee protection of the motor from overheating. It is recommended to install both an external thermal and PTC thermistor for overheat protection.
- Do not use a magnetic contactor on the inverter input for frequent starting/ stopping of the inverter. Otherwise the life of the inverter decreases.
- The effect of electromagnetic interference must be reduced by using a noise filter or by other means. Otherwise nearby electronic equipment may be affected.
- Appropriate measures must be taken to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/damage the power factor correction capacitor and generator.
- When driving a 400 V class motor by the inverter, the motor must be an insulation-enhanced motor or measures must be taken to suppress surge voltage. Surge voltage attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations. because all parameters return to their initial values.
- The inverter can be easily set for high-speed operation. Before changing its setting, the performances of the motor and machine must be fully examined.
- Stop status cannot be held by the inverter's brake function. In addition to the inverter's brake function, a holding device must be installed to ensure safety.
- Before running an inverter which had been stored for a long period, inspection and test operation must be performed.
- Static electricity in your body must be discharged before you touch the product.
- Only one PM motor can be connected to an inverter.
- An PM motor must be used under PM sensorless vector control. Do not use a synchronous motor, induction motor, or synchronous induction motor.
- Do not connect a PM motor in the induction motor control settings (initial settings). Do not use an induction motor in the PM sensorless vector control settings. It will cause a failure.
- In the system with a PM motor, the inverter power must be turned ON before closing the contacts of the contactor at the output side.

Emergency stop

- A safety backup such as an emergency brake must be provided to prevent hazardous conditions to the machine and equipment in case of inverter failure.
- When the breaker on the inverter input side trips, the wiring must be checked for fault (short circuit), and internal parts of the inverter for a damage, etc. The cause of the trip must be identified and removed before turning ON the power of the breaker.
- When a protective function activates, take an appropriate corrective action, then reset the inverter, and resume the operation.

Maintenance, inspection and parts replacement

- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter. It will cause a failure.

Disposal

- The inverter must be treated as industrial waste.

General instruction

- Many of the diagrams and drawings in the Instruction Manual show the product without a cover or partially open for explanation. Never operate the product in this manner. The cover must be always reinstalled and the instruction in the Instruction Manual must be followed when operating the product. For more details on the PM motor, refer to the Instruction Manual of the PM motor.

1 INVERTER INSTALLATION AND PRECAUTIONS

◆ Inverter model

FR - A8 2 0 - 00046 -1 □

Symbol	Voltage class
2	200V class
4	400V class

Symbol	Description
00023 to 06830	SLD rated inverter current (A)
0.4 to 280K	ND rated inverter capacity(kW)

Symbol	Type*1
-1	FM
-2	CA

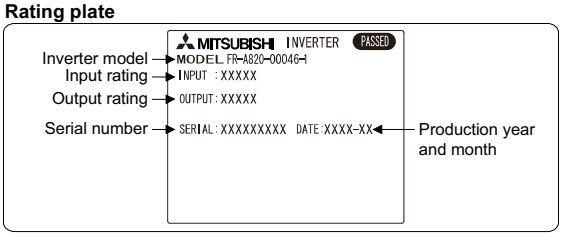
Symbol	Circuit board coating (3C2)	Plated conductor
Without	Without	Without
-60	With	Without
-06	With	With

*1 Specification differs by the type as follows.

Type	Motor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM: pulse train output Terminal AM: analog voltage output (0 to ±10VDC)	OFF	Sink logic	60Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA: analog current output (0 to 20mADC) Terminal AM: analog voltage output (0 to ±10VDC)	ON	Source logic	50Hz	8888 (95% of the power supply voltage)

Capacity plate

Rating plate

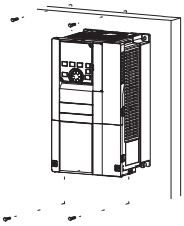


NOTE

- Hereinafter, the inverter model name consists of the rated current and the applicable motor capacity. (Example) FR-A820-00046(0.4K)

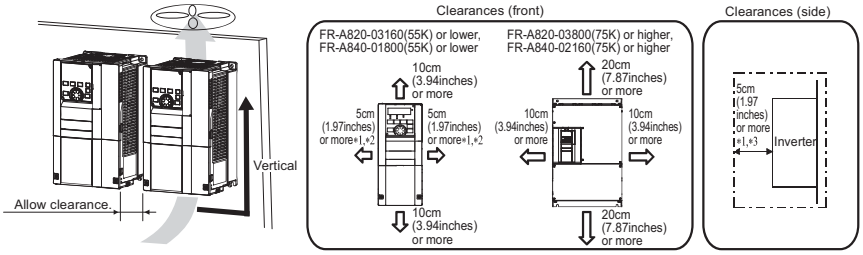
◆ Inverter placement

Installation on the enclosure



Fix six positions for the FR-A840-04320(160K).

- Install the inverter on a strong surface securely with screws.
- Leave enough clearances and take cooling measures.
- Avoid places where the inverter is subjected to direct sunlight, high temperature and high humidity.
- Install the inverter on a nonflammable wall surface.
- When encasing multiple inverters, install them in parallel as a cooling measure.



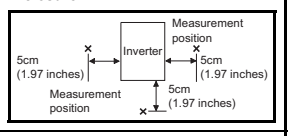
*1 For the FR-A820-00250(3.7K) or lower and FR-A840-00126(3.7K) or lower, allow 1 cm (0.39 inches) or more clearance.
*2 When using the FR-A820-01250(22K) or lower and FR-A840-00620(22K) or lower at the surrounding air temperature of 40°C (104°F) or less (30°C (86°F) or less for the SLD rated inverter), side-by-side installation (0 cm clearance) is available.
*3 For replacing the cooling fan of the FR-A840-04320(160K) or higher, 30cm of space is necessary in front of the inverter.
Refer to the Instruction Manual (Detailed) for fan replacement.

◆ Installation environment

Before installation, confirm that the following environment conditions are met.

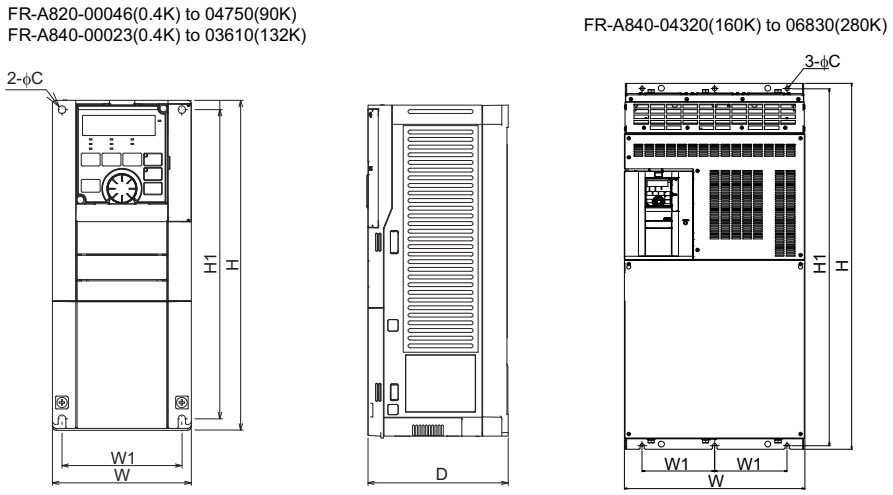
Item		Description
Surrounding air temperature*3	LD, ND (initial setting), HD	-10 to +50°C (non-freezing)
	SLD	-10 to +40°C (non-freezing)
Ambient humidity		With circuit board coating: 95% RH or less (non-condensing), Without circuit board coating: 90% RH or less (non-condensing)
Storage temperature		-20 to +65°C*1
Atmosphere		Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
Altitude		Maximum 2,500 m above sea level.*2
Vibration		5.9m/s^2 or less at 10 to 55Hz (directions of X, Y, Z axes)

Enclosure



*1 Temperature applicable for a short time, e.g. in transit.
*2 For the installation at an altitude above 1,000 m (3280.80 feet) up to 2,500 m (8202 feet), derate the rated current 3% per 500 m (1640.40 feet).
*3 Surrounding Air Temperature is a temperature measured at a measurement position in an enclosure.
Ambient Temperature is a temperature outside an enclosure.

2 OUTLINE DIMENSIONS



(Unit: mm)

◆ 200 V class

Inverter model	W	W1	H	H1	D	C
FR-A820-00046(0.4K)	110	95	260	245	110	6
FR-A820-00077(0.75K)					125	
FR-A820-00105(1.5K)	150	125			140	
FR-A820-00167(2.2K)						
FR-A820-00250(3.7K)						
FR-A820-00340(5.5K)	220	195			170	
FR-A820-00490(7.5K)						
FR-A820-00630(11K)			300	285	190	
FR-A820-00770(15K)	250	230	400	380		10
FR-A820-00930(18.5K)						
FR-A820-01250(22K)						
FR-A820-01540(30K)	325	270	550	530	195	
FR-A820-01870(37K)	435	380		525	250	12
FR-A820-02330(45K)						
FR-A820-03160(55K)	465	410	700	675		
FR-A820-03800(75K)		400	740	715	360	
FR-A820-04750(90K)						

◆ 400 V class

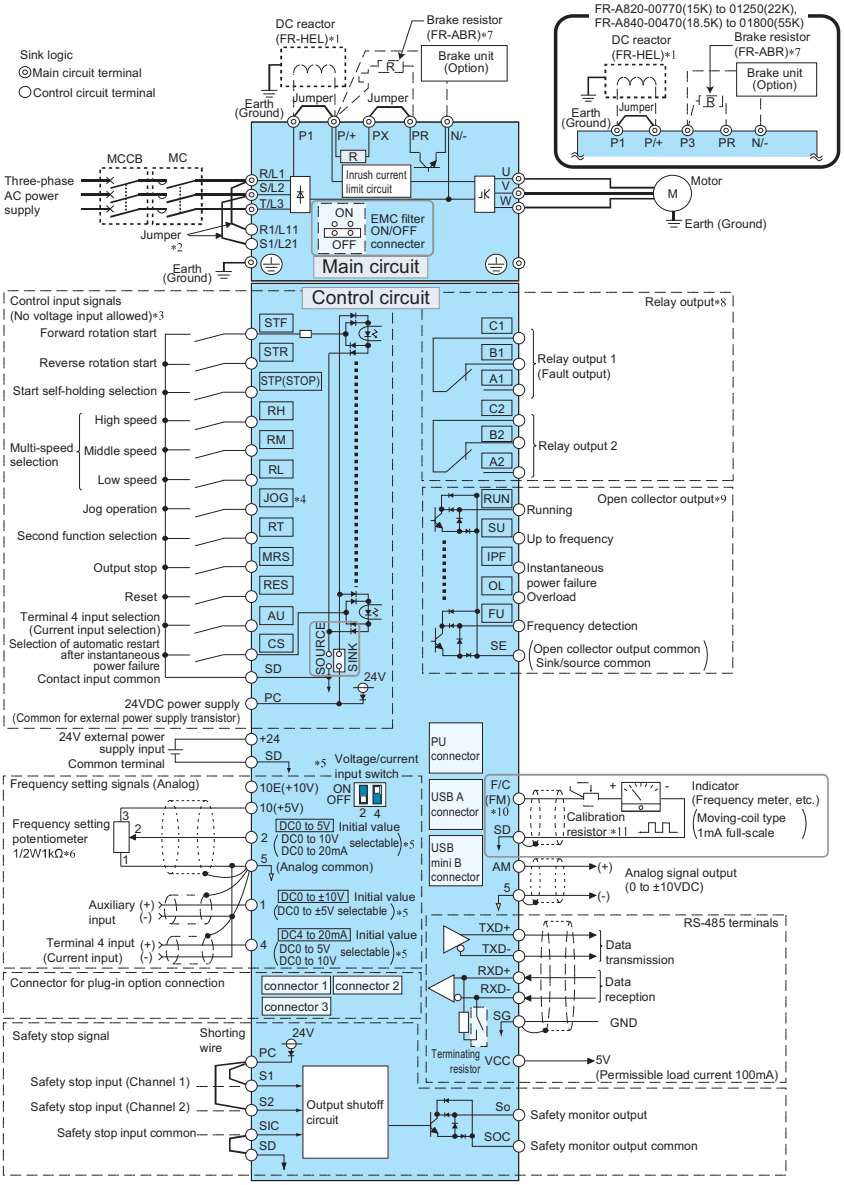
Inverter model	W	W1	H	H1	D	C
FR-A840-00023(0.4K)	150	125	260	245	140	6
FR-A840-00038(0.75K)						
FR-A840-00052(1.5K)						
FR-A840-00083(2.2K)						
FR-A840-00126(3.7K)						
FR-A840-00170(5.5K)	220	195			170	
FR-A840-00250(7.5K)						
FR-A840-00310(11K)			300	285	190	
FR-A840-00380(15K)						
FR-A840-00470(18.5K)	250	230	400	380		10
FR-A840-00620(22K)						
FR-A840-00770(30K)	325	270	550	530	195	

Inverter model	W	W1	H	H1	D	C
FR-A840-00930(37K)	435	380	550	525	250	12
FR-A840-01160(45K)						
FR-A840-01800(55K)						
FR-A840-02160(75K)	465	400	620	595	300	
FR-A840-02600(90K)						
FR-A840-03250(110K)			740	715	360	
FR-A840-03610(132K)						
FR-A840-04320(160K)	498	200	1010	985	380	
FR-A840-04810(185K)						
FR-A840-05470(220K)	680	300		984		
FR-A840-06100(250K)						
FR-A840-06830(280K)						

3 WIRING

3.1 Terminal connection diagrams

◆ FM type



*1 For the FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher, always connect an optional DC reactor (FR-HEL). (When selecting a DC reactor, refer to page 25, and select one suitable for the applicable motor capacity.) If a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.

*2 When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.

*3 The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**. (Refer to page 17.)

*4 Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.

*5 Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267)**. To input a voltage (0 to 5 V/ 0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)** (Refer to the Instruction Manual (Detailed).)

*6 It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

*7 If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)). The terminal PR is equipped in FR-A820-00046(0.4K) to 01250(22K), FR-A840-00023(0.4K) to 01800(55K). Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)

*8 The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**. (Refer to page 17.)

*9 The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194)**. (Refer to page 17.)

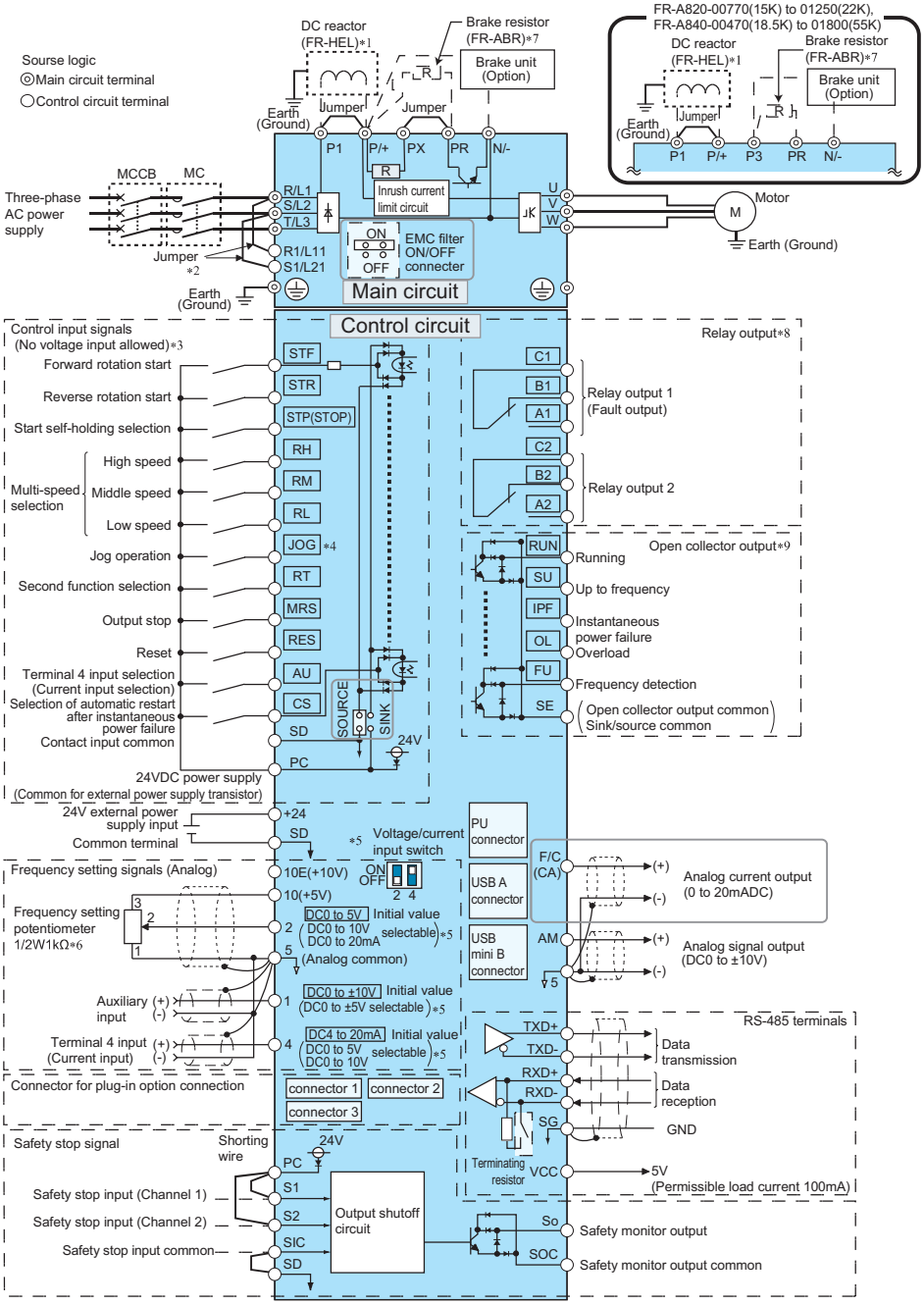
*10 The terminal F/C(FM) can be used to output pulse trains as open collector output by setting **Pr.291**.

*11 Not required when calibrating the scale with the operation panel.

NOTE

- To prevent a malfunction due to noise, keep the signal cables 10 cm or more away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at the output side.
- After wiring, wire offcuts must not be left in the inverter. Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take caution not to allow chips and other foreign matter to enter the inverter.
- Set the voltage/current input switch correctly. Incorrect setting may cause a fault, failure or malfunction.

◆ CA type



*1 For the FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher, always connect an optional DC reactor (FR-HEL). (When selecting a DC reactor, refer to page 25, and select one suitable for the applicable motor capacity.) If a jumper is installed across the terminals P1 and P/+, remove the jumper before installing the DC reactor.

*2 When using separate power supply for the control circuit, remove the jumper between R1/L11 and S1/L21.

*3 The function of these terminals can be changed with the input terminal assignment **(Pr.178 to Pr.189)**. (Refer to page 17.)

*4 Terminal JOG is also used as the pulse train input terminal. Use **Pr.291** to choose JOG or pulse.

*5 Terminal input specifications can be changed by analog input specification switchover **(Pr.73, Pr.267).** To input a voltage (0 to 5 V/ 0 to 10 V), set the voltage/current input switch OFF. To input a current (4 to 20 mA), set the voltage/current input switch ON. Terminals 10 and 2 are also used as a PTC input terminal. **(Pr.561)** (Refer to the Instruction Manual (Detailed).)

*6 It is recommended to use 2W1kΩ when the frequency setting signal is changed frequently.

*7 If connecting a brake resistor, remove the jumper between PR and PX (FR-A820-00046(0.4K) to 00490(7.5K), FR-A840-00023(0.4K) to 00250(7.5K)). The terminal PR is equipped in FR-A820-00046(0.4K) to 02330(45K), FR-A840-00023(0.4K) to 01800(55K). Install a thermal relay to prevent overheating and damage of discharging resistors. (Refer to the Instruction Manual (Detailed).)

*8 The function of these terminals can be changed with the output terminal assignment **(Pr.195, Pr.196)**. (Refer to page 17.)

*9 The function of these terminals can be changed with the output terminal assignment **(Pr.190 to Pr.194).** (Refer to page 17.)

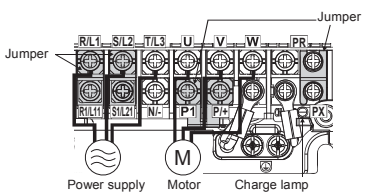
NOTE

- To prevent a malfunction due to noise, keep the signal cables 10 cm or more away from the power cables. Also, separate the main circuit cables at the input side from the main circuit cables at the output side.
- After wiring, wire offcuts must not be left in the inverter. Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take caution not to allow chips and other foreign matter to enter the inverter.
- Set the voltage/current input switch correctly. Incorrect setting may cause a fault, failure or malfunction.

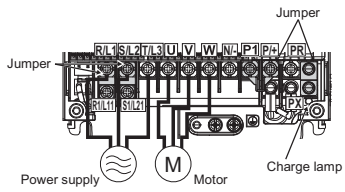
3.2 Main circuit terminals

◆ Terminal arrangement and wiring

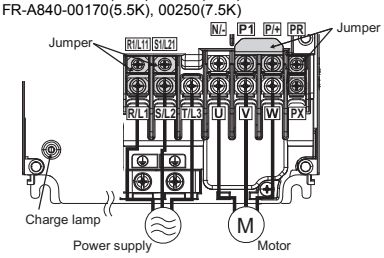
FR-A820-00046(0.4K), 00077(0.75K)



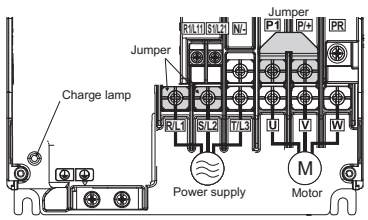
FR-A820-00105(1.5K) to 00250(3.7K)
FR-A840-00023(0.4K) to 00126(3.7K)



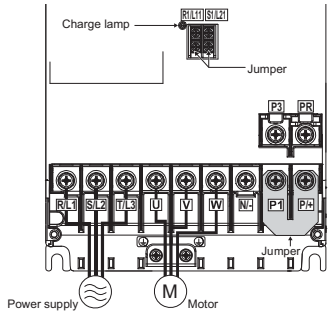
FR-A820-00340(5.5K), 00490(7.5K)
FR-A840-00170(5.5K), 00250(7.5K)



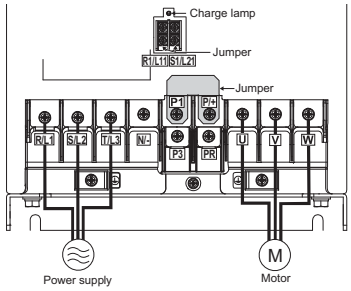
FR-A820-00630(11K)
FR-A840-00310(11K), 00380(15K)



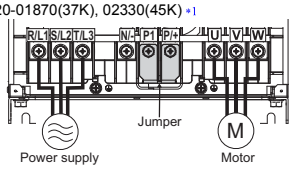
FR-A820-00770(15K) to 01250(22K)
FR-A840-00470(18.5K), 00620(22K)



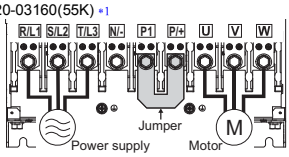
FR-A820-01540(30K) *2
FR-A840-00770(30K)



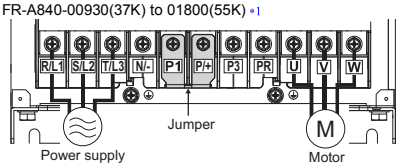
FR-A820-01870(37K), 02330(45K) *1



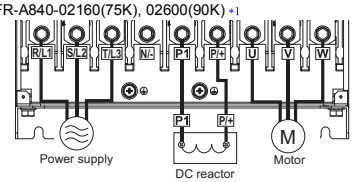
FR-A820-03160(55K) *1



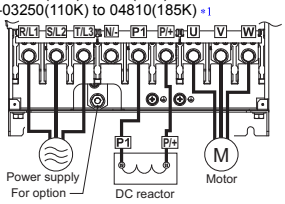
FR-A840-00930(37K) to 01800(55K) *1



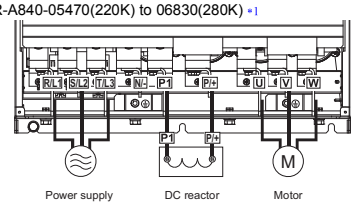
FR-A840-02160(75K), 02600(90K) *1



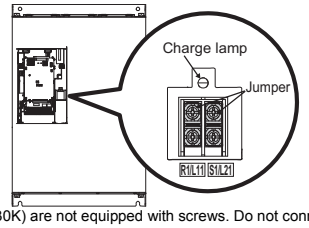
FR-A820-03800(75K), 04750(90K) *1
FR-A840-03250(110K) to 04810(185K) *1



FR-A840-05470(220K) to 06830(280K) *1



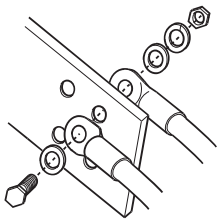
*1 The following diagram shows the positions of R1/L11, S1/L21, and the charge lamp.



*2 The terminals P3 and PR of the FR-A820-01540(30K) are not equipped with screws. Do not connect anything to these.

NOTE

- Make sure the power cables are connected to the R/L1, S/L2, T/L3. (Phase need not be matched.) Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter.
- Connect the motor to U, V, and W. Turning ON the forward rotation switch (signal) at this time rotates the motor counterclockwise when viewed from the load shaft. (The phase sequence must be matched.)
- The charge lamp will turn ON when the power is supplied to the main circuit.
- When wiring the inverter main circuit conductor of the FR-A840-05470(220K) or higher, tighten a nut from the right side of the conductor. When wiring two wires, place wires on both sides of the conductor. (Refer to the drawing on the right.) For wiring, use bolts (nuts) provided with the inverter.



◆ Cable gauge of main circuit terminals and earth (ground) terminals

Use an appropriate cable gauge to suppress the voltage drop to 2% or less.
If the wiring distance is long between the inverter and motor, a voltage drop in the main circuit will cause the motor torque to decrease especially at a low speed.
The following table indicates a selection example for the wiring length of 20 m.

- 200 V class (220 V input power supply, 150% overload current rating for 1 minute)

Applicable inverter model	Terminal screw Size *4	Tightening torque N•m	Crimping terminal		Cable gauge								
					HIV cables, etc. (mm^2) *1				AWG/MCM *2		PVC cables, etc. (mm^2) *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
FR-A820-00046(0.4K) to 00167(2.2K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
FR-A820-00250(3.7K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
FR-A820-00340(5.5K)	M5(M4)	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	6
FR-A820-00490(7.5K)	M5(M4)	2.5	14-5	8-5	14	8	14	5.5	6	8	16	10	16
FR-A820-00630(11K)	M5	2.5	14-5	14-5	14	14	14	8	6	6	16	16	16
FR-A820-00770(15K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
FR-A820-00930(18.5K)	M8(M6)	7.8	38-8	38-8	38	38	38	14	2	2	35	35	25
FR-A820-01250(22K)	M8(M6)	7.8	38-8	38-8	38	38	38	22	2	2	35	35	25
FR-A820-01540(30K)	M8(M6)	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
FR-A820-01870(37K)	M10(M8)	14.7	80-10	80-10	80	80	80	22	3/0	3/0	70	70	35
FR-A820-02330(45K)	M10(M8)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-A820-03160(55K)	M12(M8)	24.5	100-12	100-12	100	100	100	38	4/0	4/0	95	95	50
FR-A820-03800(75K)	M12(M8)	24.5	150-12	150-12	125	125	125	38	250	250	—	—	—
FR-A820-04750(90K)	M12(M8)	24.5	150-12	150-12	150	150	150	38	300	300	—	—	—

- 400 V class (440 V input power supply, 150% overload current rating for 1 minute)

Applicable inverter model	Terminal screw Size *4	Tightening torque N•m	Crimping terminal		Cable gauge								
					HIV cables, etc. (mm^2) *1				AWG/MCM *2		PVC cables, etc. (mm^2) *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable
FR-A840-00023(0.4K) to 00126(3.7K)	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
FR-A840-00170(5.5K)	M4	1.5	2-4	2-4	2	2	3.5	3.5	12	14	2.5	2.5	4
FR-A840-00250(7.5K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
FR-A840-00310(11K)	M5	2.5	5.5-5	5.5-5	5.5	5.5	5.5	5.5	10	10	6	6	10
FR-A840-00380(15K)	M5	2.5	8-5	8-5	8	8	8	5.5	8	8	10	10	10
FR-A840-00470(18.5K)	M6	4.4	14-6	8-6	14	8	14	8	6	8	16	10	16
FR-A840-00620(22K)	M6	4.4	14-6	14-6	14	14	22	14	6	6	16	16	16
FR-A840-00770(30K)	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
FR-A840-00930(37K)	M8	7.8	22-8	22-8	22	22	22	14	4	4	25	25	16
FR-A840-01160(45K)	M8	7.8	38-8	38-8	38	38	38	22	1	2	50	50	25
FR-A840-01800(55K)	M8	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
FR-A840-02160(75K)	M10	14.7	60-10	60-10	60	60	60	22	1/0	1/0	50	50	25
FR-A840-02600(90K)	M10	14.7	60-10	60-10	60	60	80	22	3/0	3/0	50	50	25
FR-A840-03250(110K)	M10(M12)	14.7	80-10	80-10	80	80	80	22	3/0	3/0	70	70	35
FR-A840-03610(132K)	M10(M12)	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-A840-04320(160K)	M12(M10)	24.5	150-12	150-12	125	150	150	38	250	250	120	120	70
FR-A840-04810(185K)	M12(M10)	24.5	150-12	150-12	150	150	150	38	300	300	150	150	95
FR-A840-05470(220K)	M12(M10)	46	100-12	100-12	2×100	2×100	2×100	60	2×4/0	2×4/0	2×95	2×95	95
FR-A840-06100(250K)	M12(M10)	46	100-12	100-12	2×100	2×100	2×125	60	2×4/0	2×4/0	2×95	2×95	95
FR-A840-06830(280K)	M12(M10)	46	150-12	150-12	2×125	2×125	2×125	60	2×250	2×250	2×120	2×120	120

*1 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower, this cable gauge is with the continuous maximum permissible temperature of 75°C (HIV cable (600 V class 2 vinyl-insulated cable), etc.). Assumes that the surrounding air temperature is 50°C or less and the wiring distance is 20 m or less.
For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher, this cable gauge is with the continuous maximum permissible temperature of 90°C or higher (LMFC (heat resistant flexible cross-linked polyethylene insulated cable), etc.). Assumes that the surrounding air temperature is 50°C or less and the wiring is in-enclosure.

*2 For all the 200 V class capacities and FR-A840-01160(45K) or lower, this cable gauge is with the continuous maximum permissible temperature of 75°C (THHW cable). This is assumes a surrounding air temperature of 40°C or less and wiring distance of 20 m or less.
For FR-A840-01800(55K) or higher, this cable gauge is with continuous maximum permissible temperature of 90°C (THHN cable). This assumes a surrounding air temperature of 40°C or lower and in-enclosure wiring.

*3 For FR-A820-00770(15K) or lower and FR-A840-01160(45K) or lower, the cable gauge is with the continuous maximum permissible temperature of 70°C (PVC cable). This assumes a surrounding air temperature of 40°C or less and wiring distance of 20 m or less.
For FR-A820-00930(18.5K) or higher and FR-A840-01800(55K) or higher, this cable gauge is with continuous maximum permissible temperature of 90°C (XLPE cable). This assumes a surrounding air temperature of 40°C and in-enclosure wiring.

*4 The terminal screw size indicates the size of the terminal screw for R/L1, S/L2, T/L3, U, V, W, PR, PX, P/+, N/-, P1, P3, and the screw for earthing (grounding).
The screw size for PR and PX terminals of FR-A820-00340(5.5K) and FR-A820-00490(7.5K) is indicated in parentheses.
The screw size for earthing (grounding) of FR-A820-00930(18.5K) or higher is indicated in parentheses.
The screw size for P/+ terminal for connecting an option to FR-A840-03250(110K) or FR-A840-03610(132K) is indicated in parentheses.
The screw size for earthing (grounding) of FR-A840-04320(160K) or higher is indicated in parenthesis.

The line voltage drop can be calculated by the following formula:

Line voltage drop [V] = $\sqrt{3}$ × wire resistance[mΩ/m] × wiring distance[m] × current[A] / 1000

Use a larger diameter cable when the wiring distance is long or when it is desired to decrease the voltage drop (torque reduction) in the low speed range.

NOTE

- Tighten the terminal screw to the specified torque. A screw that has been tightened too loosely can cause a short circuit or malfunction. A screw that has been tightened too tightly can cause a short circuit or malfunction due to the unit breakage.
- Use crimping terminals with insulation sleeves to wire the power supply and motor.

◆ Total wiring length

◆ With general-purpose motor

Connect one or more general-purpose motors within the total wiring length shown in the following table. (The wiring length should be 100 m or less under vector control.)

Pr.72 setting (carrier frequency)	FR-A820-00046(0.4K), FR-A840-00023(0.4K)	FR-A820-00077(0.75K), FR-A840-00038(0.75K)	FR-A820-00105(1.5K) or higher, FR-A840-00052(1.5K) or higher
2 (2kHz) or lower	300m	500m	500m
3 (3kHz) or higher	200m	300m	500m

When driving a 400 V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor. In this case, take one of the following measure.

- Use a "400 V class inverter-driven insulation-enhanced motor" and set **Pr. 72 PWM frequency selection** according to the wiring length.

Wiring length shorter than 50 m	Wiring length 50 m to 100 m	Wiring length longer than 100 m
15(14.5kHz) or less	9(9kHz) or less	4(4kHz) or less

- Connect the surge voltage suppression filter (FR-ASF-H, FR-BMF-H) to the output side of the FR-A840-01800(55K) or lower and the sine wave filter (MT-BSL, MT-BSC) to the output side of the FR-A840-02160(75K) or higher.

◆ With PM motor

Use the wiring length of 100 m or shorter when connecting a PM motor.
Use one PM motor for one inverter. Multiple PM motors cannot be connected to an inverter.
When the wiring length exceeds 50 m for a 400 V class motor driven by an inverter under PM sensorless vector control, set "9" (6 kHz) or less in **Pr.72 PWM frequency selection**.

NOTE

- Especially for long-distance wiring, the inverter may be affected by a charging current caused by stray capacitances of the wiring, leading to an activation of the overcurrent protection, malfunction of the fast-response current limit operation, or even to an inverter failure. If the fast-response current limit function malfunctions, disable this function.

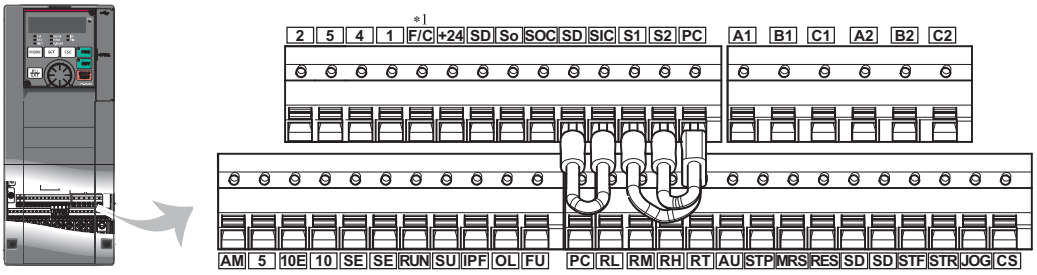
  (**Pr.156 Stall prevention operation selection** Refer to Chapter 5 of the Instruction Manual (Detailed).)
- The optional surge voltage suppression filter (FR-ASF-H/FR-BMF-H) or sine wave filter (MT-BSL/MT-BSC) cannot be used under PM sensorless vector control. Do not connect it.
- For details of **Pr.72 PWM frequency selection**, refer to Chapter 5 of the Instruction Manual (Detailed).
- The FR-ASF-H are FR-BMF-H can be used under V/F control and Advanced magnetic flux vector control. The MT-BSL and MT-BSC can be used under V/F control. (For details, refer to the Instruction Manual of the option.)
- Refer to Chapter 3 in the Instruction Manual (Detailed) to drive a 400V class motor by an inverter.
- The carrier frequency is limited with a PM motor. (Refer to Chapter 5 of the Instruction Manual (Detailed).)

◆ Cable size for the control circuit power supply (terminals R1/L11 and S1/L21)

- Terminal screw size: M4
- Cable gauge: 0.75 mm^2 to 2 mm^2
- Tightening torque: 1.5 N•m

3.3 Control circuit terminal

◆ Terminal layout



Recommended cable gauge:
0.3 to 0.75 mm^2

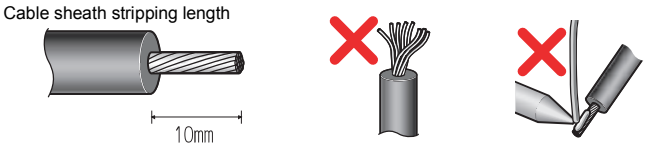
*1 The terminal functions as the terminal FM for the FM type, and as the terminal CA for the CA type.

◆ Wiring method

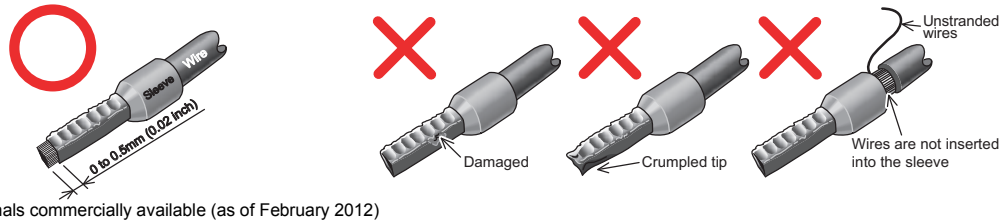
- Power supply connection

For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off the sheath of the wire and apply directly. Insert the blade terminal or the single wire into a socket of the terminal.

(1) Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off.
Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.



(2) Crimp the terminals by inserting the wires into a blade terminal.
Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.
Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.



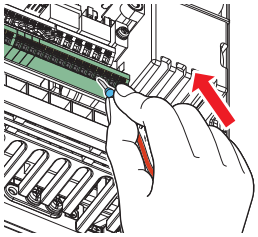
- Blade terminals commercially available (as of February 2012)

Cable gauge (mm^2)	Blade terminal model			Manufacturer	Crimping tool name
	With insulation sleeve	Without insulation sleeve	For UL wire*1		
0.3	AI 0,5-10WH	—	—	Phoenix Contact Co., Ltd.	CRIMPFOX 6
0.5	AI 0,5-10WH	—	AI 0,5-10WH-GB		
0.75	AI 0,75-10GY	A 0,75-10	AI 0,75-10GY-GB		
0.75 (for two wires)	AI-TWIN 2×0,75-10GY	—	—		

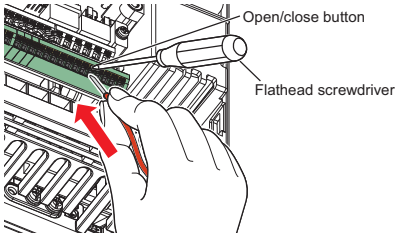
*1 A blade terminal with an insulation sleeve compatible with the MTW wire which has a thick wire insulation.

Cable gauge (mm^2)	Blade terminal product number	Insulation product number	Manufacturer	Crimping tool product number
0.3 to 0.75	BT 0.75-11	VC 0.75	NICHIFU Co.,Ltd.	NH 69

(3) Insert the wires into a socket.

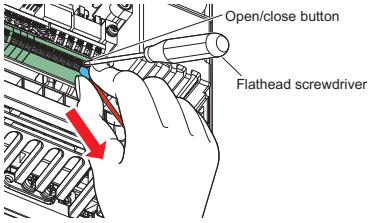


When using a single wire or stranded wires without a blade terminal, push the open/close button all the way down with a flathead screwdriver, and insert the wire.



- Wire removal

Pull the wire while pushing the open/close button all the way down firmly with a flathead screwdriver.



NOTE

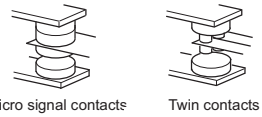
- When using stranded wires without a blade terminal, twist enough to avoid short circuit with a nearby terminals or wires.
- During wiring, pulling out the wire forcefully without pushing the open/close button all the way down may damage the terminal block.
- Use a small flathead screwdriver (tip thickness: 0.4 mm, tip width: 2.5 mm).
  If a flathead screwdriver with a narrow tip is used, terminal block may be damaged.
  Commercially available products (as of February 2012) .

Name	Model	Manufacturer
Driver	SZF 0- 0,4 x 2,5	Phoenix Contact Co., Ltd.

- Place the flathead screwdriver vertical to the open/close button. In case the blade tip slips, it may cause an inverter damage or injury.

◆ Wiring precautions

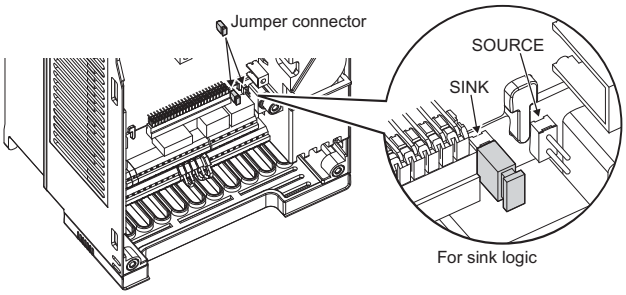
- It is recommended to use a cable of 0.75 mm^2 for connection to the control circuit terminals.
- The wiring length should be 30 m (200 m for the terminal FM) at the maximum.
- Use two or more parallel micro-signal contacts or twin contacts to prevent contact faults when using contact inputs since the control circuit input signals are micro-currents.



- To suppress EMI, use shielded or twisted cables for the control circuit terminals and run them away from the main and power circuits (including the 200 V relay sequence circuit). For the cables connected to the control circuit terminals, connect their shields to the common terminal of the connected control circuit terminal. When connecting an external power supply to the terminal PC, however, connect the shield of the power supply cable to the negative side of the external power supply. Do not directly earth (ground) the shield to the enclosure, etc.
- Do not apply a voltage to the contact input terminals (STF, etc.) of the control circuit.
- Always apply a voltage to the fault output terminals (A1, B1, C1, A2, B2, C2) via a relay coil, lamp, etc.

◆ Control logic (sink/source) change

Change the control logic of input signals as necessary.
To change the control logic, change the jumper connector position on the control circuit board.
Connect the jumper connector to the connector pin of the desired control logic.
The control logic of input signals is initially set to the sink logic (SINK) for the FM type.
The control logic of input signals is initially set to the source logic (SOURCE) for the CA type.
(The output signals may be used in either the sink or source logic independently of the jumper connector position.)



◆ When supplying 24 V external power to the control circuit

Connect the 24 V external power supply across terminals +24 and SD. The 24 V external power supply enables I/O terminal ON/OFF operation, operation panel displays, control functions, and communication during communication operation even during power-OFF of inverter's main circuit power supply.
During the 24 V external power supply operation, "EV" flickers on the operation panel.

◆ Applied 24 V external power specification

Item	Rated specification
Input voltage	23 to 25.5VDC
Input current	1.4A or less

3.4 Safety stop function

◆ Function description

The terminals related to the safety stop function are shown below.

Terminal symbol	Terminal function description	
S1 *1	For input of the safety stop channel 1.	Open between S1 and SIC, and between S2 and SIC: In safety stop mode. Short: Other than the safety stop mode.
S2 *1	For input of the safety stop channel 2.	
SIC *1	Common terminal for terminals S1 and S2.	
SO	Outputs when an alarm or failure is detected. The signal is output when no internal safety circuit failure*2 exists.	OFF: Internal safety circuit failure *2 ON: No internal safety circuit failure *2
SOC	Terminal SO (open collector output) common	

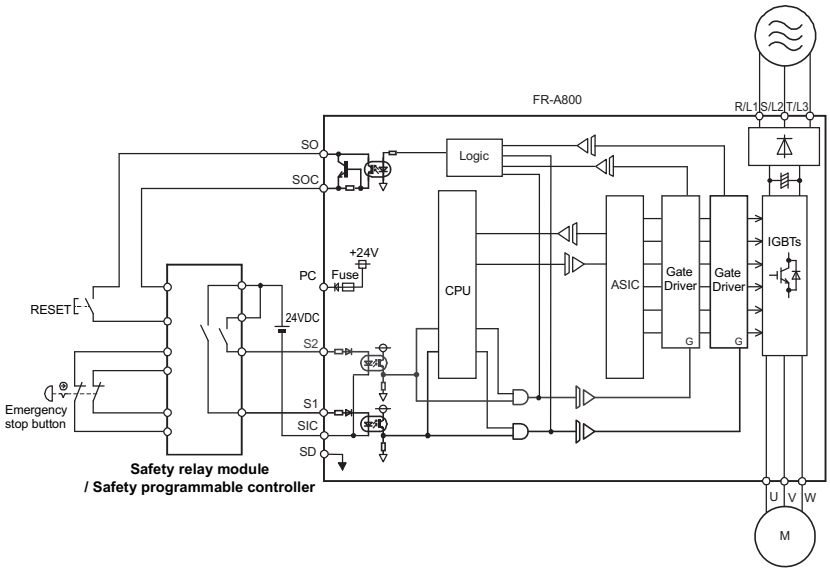
*1 In the initial status, terminals S1 and PC, S2 and PC, and SIC and SD are respectively shorted with shorting wires. To use the safety stop function, remove all the shortning wires, and then connect to the safety relay module as shown in the following connection diagram.
*2 At an internal safety circuit failure, the operation panel displays one of the faults shown on the next page.

NOTE

- Use the terminal SO to output a fault and to prevent restarting of the inverter. The signal cannot be used as safety stop input signal to other devices.

◆ Connection diagram

To prevent automatic restart after a fault occurrence, connect the reset button of a safety relay module or a safety programmable controller across the terminals SO and SOC. The reset button acts as the feedback input for the safety relay module or the safety programmable controller.



◆ Safety stop function operation

Input power	Input signal		Internal safety circuit failure *1	Output signal	Inverter operation enable signal
	S1-SIC	S2-SIC		SO *3	
OFF	—	—	—	OFF	Output shutoff (Safe state)
ON	**Short**	**Short**	**No failure**	**ON**	**Drive enabled**
			Failure	OFF	Output shutoff (Safe state)
	Open	Open	**No failure** *2	**ON**	Output shutoff (Safe state)
			Failure	OFF	Output shutoff (Safe state)
	Short	Open	N/A *4	OFF	Output shutoff (Safe state)
	Open	**Short**	N/A *4	OFF	Output shutoff (Safe state)

*1 At an internal safety circuit failure, the operation panel displays one of the faults shown below.
*2 SA is displayed on the operation panel when both of the S1 and S2 signals are in the open status and no internal safety circuit failure exists.
*3 ON: Transistor used for an open collector output is conducted.
OFF: Transistor used for an open collector output is not conducted.
*4 N/A denotes a condition where circuit fault does not apply.

◆ Internal safety circuit failure

At an internal safety circuit failure, the terminal SO turns OFF.
The following faults can cause the internal safety circuit failure (terminal SO = OFF).

Error Definition	Operation panel indication
Option fault	E.OPT
Communication option fault	E.OP1
Parameter storage device fault	E.PE
Retry count excess	E.RET
Parameter storage device fault	E.PE2
Operation panel power supply short circuit RS-485 terminals power supply short circuit	E.CTE
24 VDC power fault	E.P24
Safety circuit fault	E.SAF
Overspeed occurrence	E.OS

Error Definition	Operation panel indication
Speed deviation excess detection	E.OSD
Signal loss detection	E.ECT
Excessive position fault	E.OD
Brake sequence fault	E.MB1 to E.MB7
Encoder phase fault	E.EP
CPU fault	E.CPU
	E.5
	E.6
	E.7
Internal circuit fault	E.13

For more details, refer to the Safety stop function instruction manual (BCN-A23228-001). (A PDF copy of this manual can be found in the enclosed CD-ROM. For how to use this CD-ROM, refer to page 31.)

4 FAILSAFE SYSTEM WHICH USES THE INVERTER

When a fault is detected by the protective function, the protective function activates and output a fault signal (ALM). However, a fault signal may not be output at an inverter's fault occurrence when the detection circuit or output circuit fails, etc. Although Mitsubishi assures the best quality products, provide an interlock which uses inverter status output signals to prevent accidents such as damage to the machine when the inverter fails for some reason. Also, at the same time consider the system configuration where a failsafe from outside the inverter, without using the inverter, is enabled even if the inverter fails.

◆ Interlock method which uses the inverter status output signals

By combining the inverter output signals to provide an interlock as shown below, an inverter failure can be detected.

Interlock method	Check method	Used signals	Refer to
Inverter protective function operation	Operation check of an alarm contact. Circuit error detection by negative logic.	Fault output signal (ALM signal)	Chapter 5 of the Instruction Manual. (Detailed)
Inverter operating status	Operation ready signal check.	Operation ready signal (RY signal)	Chapter 5 of the Instruction Manual (Detailed).
Inverter running status	Logic check of the start signal and running signal.	Start signal (STF signal, STR signal) Running signal (RUN signal)	Chapter 5 of the Instruction Manual (Detailed)
Inverter running status	Logic check of the start signal and output current.	Start signal (STF signal, STR signal) Output current detection signal (Y12 signal)	Chapter 5 of the Instruction Manual (Detailed).

◆ Backup method outside the inverter

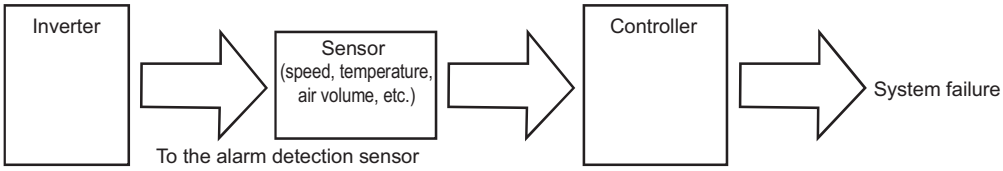
Even if the interlock is provided by the inverter status signal, enough failsafe is not ensured depending on the failure status of the inverter itself. For example, if an inverter CPU fails in a system interlocked with the inverter's fault, start, and RUN signals, no fault signal will be output and the RUN signal will be kept ON because the inverter CPU is down.
Provide a speed detector to detect the motor speed and current detector to detect the motor current and consider the backup system such as performing a check as below according to the level of importance of the system.

- Start signal and actual operation check

Check the motor running and motor current while the start signal is input to the inverter by comparing the start signal to the inverter and detected speed of the speed detector or detected current of the current detector. Note that the current is flowing through the motor while the motor coasts to stop, even after the inverter's start signal is turned OFF. For the logic check, configure a sequence considering the inverter's deceleration time. In addition, it is recommended to check the three-phase current when using the current detector.

- Command speed and actual operation check

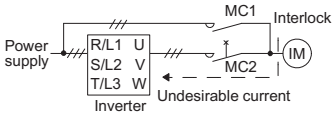
Check for a gap between the actual speed and commanded speed by comparing the inverter's speed command and the speed detected by the speed detector.



5 PRECAUTIONS FOR USE OF THE INVERTER

The FR-A800 series inverter is a highly reliable product, but incorrect peripheral circuit making or operation/handling method mayshorten the product life or damage the product. Before starting operation, always recheck the following points.

- **Use crimping terminals with insulation sleeves to wire the power supply and the motor.**
- **Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.**
- **After wiring, wire offcuts must not be left in the inverter.**
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean.
  When drilling mounting holes in an enclosure etc., take caution not to allow chips and other foreign matter to enter the inverter.
- **Use an appropriate cable gauge to suppress the voltage drop to 2% or less.**
  If the wiring distance is long between the inverter and motor, a voltage drop in the main circuit will cause the motor torque to decrease especially during the output of a low frequency.
  Refer to page 9 for the recommended cable gauge.
- **Keep the total wiring length within the specified length.**
  In long distance wiring, charging currents due to stray capacitance in the wiring may degrade the fast-response current limit operation or cause the equipment on the inverter's output side to malfunction. Pay attention to the total wiring length. (Refer to page 9.)
- **Electromagnetic wave interference**
  The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. In this case, activate the EMC filter (turn ON the EMC filter ON/OFF connector) to minimize interference. (Refer to Chapter 3 of the Instruction Manual(Detailed).)
- **Do not install a power factor correction capacitor, surge suppressor or capacitor type filter on the inverter's output side.**
  Doing so will cause the inverter to trip or the capacitor and surge suppressor to be damaged. If any of the above devices is connected, immediately remove it.
- **For some short time after the power-OFF, a high voltage remains in the smoothing capacitor, and it is dangerous.**
  A smoothing capacitor holds high voltage some time after power-OFF. When accessing the inverter for inspection, wait for at least 10 minutes after the power supply has been switched OFF, and then make sure that the voltage across the main circuit terminals P/+ and N/- of the inverter is low enough using a tester, etc.
- **If "EV" is displayed on the operation panel, turn OFF the 24 V external power supply before performing wiring.**
- **A short circuit or earth (ground) fault on the inverter's output side may damage the inverter module.**
  - Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or an earth (ground) fault caused by wiring inadequacy or reduced motor insulationresistance may damage the inverter module.
  - Fully check the to-earth (ground) insulation and phase-to-phase insulation of the inverter's output side before power-ON.
    Especially for an old motor or use in hostile atmosphere, securely check the motor insulation resistance, etc.
- **Do not use the magnetic contactor (MC) on the inverter's input side to start/stop the inverter.**
  Since repeated inrush currents at power ON will shorten the life of the converter circuit (1,000,000 times for others), frequent starts and stops of the input side MC must be avoided. Turn ON/OFF the inverter's start signals (STF, STR) to run/stop the inverter. (Refer to page 5.)
- **Across terminals P/+ and PR, connect only an external brake resistor.**
  Do not connect a mechanical brake.
- **Do not apply a voltage higher than the permissible voltage to the inverter I/O signal circuits.**
  Application of a voltage higher than the permissible voltage to the inverter I/O signal circuits or opposite polarity maydamage the I/O devices. Especially check the wiring to prevent the speed setting potentiometer from being connected incorrectly to short circuit the terminals 10E and 5.
- **To use the commercial power supply during general-purpose motor operation, be sure to provide electrical and mechanical interlocks between the electronic bypass contactors MC1 and MC2.**
  When using a switching circuit as shown right, chattering due to mis-configured sequence or arc generated at switching may allow undesirable current to flow in and damage the inverter. Mis-wiring may also damage the inverter.
  (The commercial power supply operation is not available with vector control dedicated motors (SF-V5RU, SF-THY) nor with PM motors.)



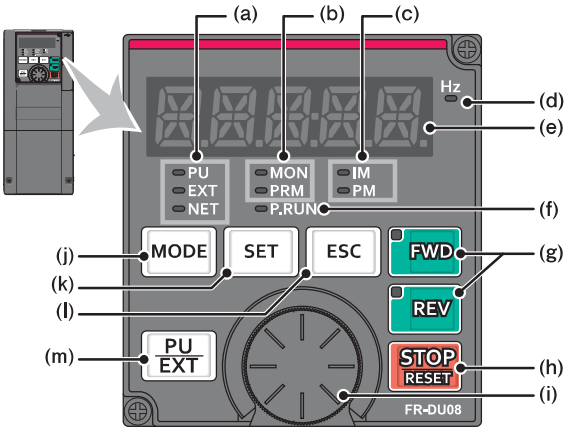
- **If the machine must not be restarted when power is restored after a power failure, provide an MC in the inverter's input side and also make up a sequence which will not switch ON the start signal.**
  If the start signal (start switch) remains ON after a power failure, the inverter will automatically restart as soon as thepower is restored.
- **Vector control is available with an encoder-equipped motor. And such an encoder must be directly connected to a motor shaft without any backlash. (Real sensorless vector control does not require an encoder.)**
- **MC on the inverter's input side**
  On the inverter's input side, connect an MC for the following purposes. (For the selection, refer to Chapter 2 of the Instruction Manual (Detailed).)
  - To disconnect the inverter from the power supply at activation of a protective function or at malfunctioning of the driving system (emergency stop, etc.).
  - To prevent any accident due to an automatic restart at power restoration after an inverter stop made by a powerfailure.
  - To separate the inverter from the power supply to ensure safe maintenance and inspection work.

  If using the MC on the inverter's input side for emergency stop during normal operation, select an MC by regarding the rated motor current as the AC-3 class rated current.
- **Handling of the magnetic contactor on the inverter's output side**
  Switch the magnetic contactor between the inverter and motor only when both the inverter and motor are at a stop. When the magnetic contactor is turned ON while the inverter is operating, overcurrent protection of the inverter and such will activate. When providing MCs to use the commercial power supply during general-purpose motor operation, switch the MCs after both the inverter and motor stop.
  An PM motor is a synchronous motor with high-performance magnets embedded inside. High-voltage is generated at the motor terminals while the motor is running even after the inverter power is turned OFF. Before wiring or inspection, confirm that the motor is stopped. In an application, such as fan and blower, where the motor is driven by the load, a low-voltage manual contactor must be connected at the inverter's output side, and wiring and inspection must be performed while the contactor is open. Otherwise you may get an electric shock.
- **Countermeasures against inverter-generated EMI**
  If electromagnetic noise generated from the inverter causes the frequency setting signal to fluctuate and the motor rotation speed to be unstable when changing the motor speed with analog signals, the following countermeasures are effective.
  - Do not run the signal cables and power cables (inverter I/O cables) in parallel with each other and do not bundle them.
  - Run signal cables as far away as possible from power cables (inverter I/O cables).
  - Use shielded cables.
  - Install a ferrite core on the signal cable (Example: ZCAT3035-1330 TDK).
- **Instructions for overload operation**
  When performing frequent starts/stops by the inverter, rise/fall in the temperature of the transistor element of the inverter will repeat due to a repeated flow of large current, shortening the life from thermal fatigue. Since thermal fatigue is related to the amount of current, the life can be increased by reducing current at locked condition, starting current, etc. Reducing current may extend the service life but may also cause torque shortage, which leads to a start failure. Adding a margin to the current can eliminate such a condition. For a general-purpose motor, use an inverter of a higher capacity (up to 2 ranks). For an IPM motor, use an inverter and IPM motor of higher capacities.
- **Make sure that the specifications and rating match the system requirements.**

6 DRIVE THE MOTOR

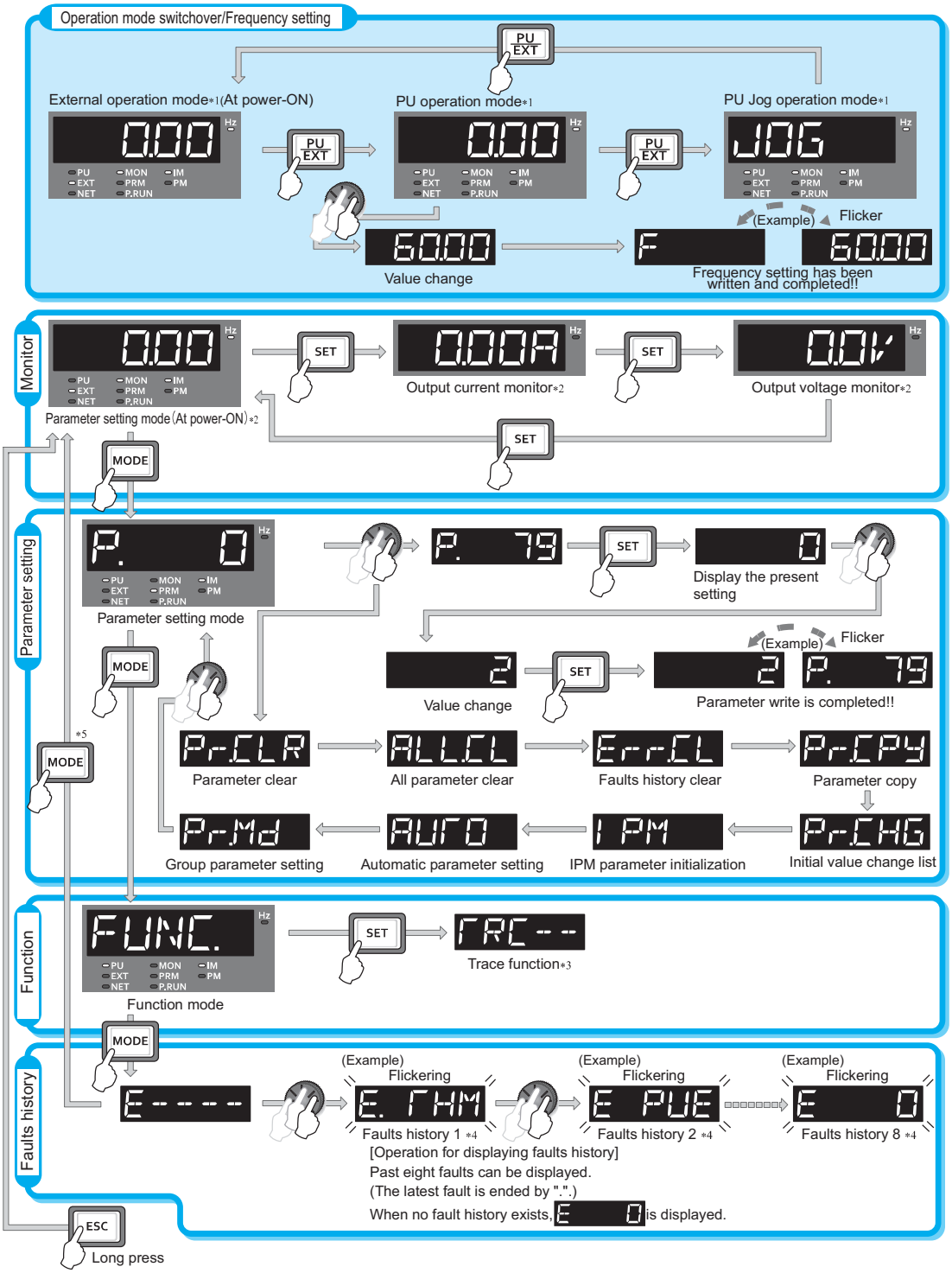
6.1 Operation panel (FR-DU08)

6.1.1 Components of the operation panel (FR-DU08)



No.	Component	Name	Description
(a)	PU EXT NET	Operation mode indicator	PU: ON to indicate the PU operation mode. EXT: ON to indicate the External operation mode. (ON at power-ON in the initial setting.) NET: ON to indicate the Network operation mode. PU and EXT: ON to indicate the External/PU combined operation mode 1 or 2.
(b)	MON PRM	Operation panel status indicator	MON: ON to indicate the monitoring mode. Quickly flickers twice intermittently while the protective function is activated. Slowly flickers in the display-off mode. PRM: ON to indicate the parameter setting mode.
(c)	IM PM	Control motor indicator	IM: ON to indicate the induction motor control. PM: ON to indicate the PM sensorless vector control. The indicator flickers when test operation is selected.
(d)	Hz	Frequency unit indicator	ON to indicate frequency. (Flickers when the set frequency is displayed in the monitor.)
(e)		Monitor (5-digit LED)	Shows the frequency, parameter number, etc. (Using **Pr.52, Pr.774 to Pr.776**, the monitored item can be changed.)
(f)	P.RUN	PLC function indicator	ON to indicate that the sequence program can be executed.
(g)	FWD REV	FWD key, REV key	FWD key: Starts forward rotation. The LED is on during forward operation. REV key: Starts reverse rotation. The LED is on during reverse operation. The LED flickers under the following conditions. • When the frequency command is not given even if the forward/reverse command is given. • When the frequency command is the starting frequency or lower. • When the MRS signal is being input.
(h)	STOP RESET	STOP/RESET key	Stops the operation commands. Resets the inverter when the protection function is activated.
(i)		Setting dial	The setting dial of the Mitsubishi inverters. The setting dial is used to change the frequency and parameter settings. Press the setting dial to perform the following operations: • To display a set frequency in the monitoring mode (the setting can be changed using **Pr.992**.) • To display the present setting during calibration • To display a fault history number in the faults history mode
(j)	MODE	MODE key	Switches to different modes. Switches to the easy setting mode by pressing simultaneously with PU/EXT. Holding this key for 2 seconds locks the operation. The key lock is invalid when **Pr.161**="0 (initial setting)". (Refer to the Instruction Manual (Detailed).)
(k)	SET	SET key	Enters each setting. If pressed during operation, the monitored item changes. (Using **Pr.52** and **Pr.774-Pr.776**, the monitored item can be changed.) When the initial setting is set Output frequency → Output current → Output voltage
(l)	ESC	ESC key	Goes back to the previous display. Holding this key for a longer time changes the mode back to the monitor mode.
(m)	PU/EXT	PU/EXT key	Switches between the PU mode and the External operation mode. Switches to the easy setting mode by pressing simultaneously with MODE. Cancels the PU stop also.

6.1.2 Basic operation (factory setting)



*1 For the details of operation modes, refer to the Instruction Manual (Detailed).
*2 Monitored items can be changed. (Refer to the Instruction Manual (Detailed).)
*3 For the details of the trace function, refer to the Instruction Manual (Detailed).
*4 For the details of faults history, refer to the Instruction Manual (Detailed).
*5 The USB memory mode will appear if a USB memory device is connected. Refer to the Instruction Manual (Detailed) for the details of the USB memory mode.

6.2 Parameter list

For simple variable-speed operation of the inverter, the initial values of the parameters may be used as they are. Set the necessary parameters to meet the load and operational specifications. Parameter setting, change and check can be performed from the operation panel (FR-DU08).

Pr.	Name	Setting range	Initial value
0 *14	Torque boost	0 to 30%	6/4/3/2/1% *1
1 *14	Maximum frequency	0 to 120Hz	120Hz *2 60Hz *3
2 *14	Minimum frequency	0 to 120Hz	0Hz
3 *14	Base frequency	0 to 590Hz	60/50Hz *10
4 *14	Multi-speed setting (high speed)	0 to 590Hz	60/50Hz *10
5 *14	Multi-speed setting (middle speed)	0 to 590Hz	30Hz
6 *14	Multi-speed setting (low speed)	0 to 590Hz	10Hz
7 *14	Acceleration time	0 to 3600s	5s *4 15s *5
8 *14	Deceleration time	0 to 3600s	5s *4 15s *5
9 *14	Electronic thermal O/L relay	0 to 500A *2 0 to 3600A *3	Rated inverter current
10	DC injection brake operation frequency	0 to 120Hz, 9999	3Hz
11	DC injection brake operation time	0 to 10s, 8888	0.5s
12	DC injection brake operation voltage	0 to 30%	4/2/1% *6
13	Starting frequency	0 to 60Hz	0.5Hz
14	Load pattern selection	0 to 5	0
15	Jog frequency	0 to 590Hz	5Hz
16	Jog acceleration/ deceleration time	0 to 3600s	0.5s
17	MRS input selection	0, 2, 4	0
18	High speed maximum frequency	0 to 590Hz	120Hz *2 60Hz *3
19	Base frequency voltage	0 to 1000V, 8888, 9999	9999/8888 *10
20	Acceleration/ deceleration reference frequency	1 to 590Hz	60/50Hz *10
21	Acceleration/ deceleration time increments	0, 1	0
22	Stall prevention operation level (Torque limit level)	0 to 400%	150%
23	Stall prevention operation level compensation factor at double speed	0 to 200%, 9999	9999
24 to 27	Multi-speed setting (4 speed to 7 speed)	0 to 590Hz, 9999	9999
28	Multi-speed input compensation selection	0, 1	0
29	Acceleration/ deceleration pattern selection	0 to 6	0
30	Regenerative function selection	0 to 2, 10, 11, 20, 21, 100 to 102, 110, 111, 120, 121	0
31	Frequency jump 1A	0 to 590Hz, 9999	9999
32	Frequency jump 1B		9999
33	Frequency jump 2A		9999
34	Frequency jump 2B		9999
35	Frequency jump 3A		9999
36	Frequency jump 3B		9999
37	Speed display	0, 1 to 9998	0
41	Up-to-frequency sensitivity	0 to 100%	10%
42	Output frequency detection	0 to 590Hz	6Hz
43	Output frequency detection for reverse rotation	0 to 590Hz, 9999	9999
44	Second acceleration/ deceleration time	0 to 3600s	5s
45	Second deceleration time	0 to 3600s, 9999	9999
46	Second torque boost	0 to 30%, 9999	9999
47	Second V/F (base frequency)	0 to 590Hz, 9999	9999
48	Second stall prevention operation level	0 to 400%	150%
49	Second stall prevention operation frequency	0 to 590Hz, 9999	0Hz
50	Second output frequency detection	0 to 590Hz	30Hz

Pr.	Name	Setting range	Initial value
51	Second electronic thermal O/L relay	0 to 500A, 9999 *2 0 to 3600A, 9999 *3	9999
52	Operation panel main monitor selection	0, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 98, 100	0
54	FM/CA terminal function selection *10	1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53, 61, 62, 67, 70, 87 to 90, 92, 93, 95, 97, 98	1
55	Frequency monitoring reference	0 to 590Hz	60/50Hz *10
56	Current monitoring reference	0 to 500A *2 0 to 3600A *3	Rated inverter current
57	Restart coasting time	0, 0.1 to 30s, 9999	9999
58	Restart cushion time	0 to 60s	1s
59	Remote function selection	0 to 3, 11 to 13	0
60	Energy saving control selection	0, 4, 9	0
61	Reference current	0 to 500A, 9999 *2 0 to 3600A, 9999 *3	9999
62	Reference value at acceleration	0 to 400%, 9999	9999
63	Reference value at deceleration	0 to 400%, 9999	9999
64	Starting frequency for elevator mode	0 to 10Hz, 9999	9999
65	Retry selection	0 to 5	0
66	Stall prevention operation reduction starting frequency	0 to 590Hz	60/50Hz *10
67	Number of retries at fault occurrence	0 to 10, 101 to 110	0
68	Retry waiting time	0.1 to 600s	1s
69	Retry count display erase	0	0
70	Special regenerative brake duty	0 to 100%	0%
71	Applied motor	0 to 6, 13 to 16, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 70, 73, 74, 330, 333, 334, 8090, 8093, 8094, 9090, 9093, 9094	0
72	PWM frequency selection	0 to 15 *2 0 to 6, 25 *3	2
73	Analog input selection	0 to 7, 10 to 17	1
74	Input filter time constant	0 to 8	1
75	Reset selection/ disconnected PU detection/PU stop selection	0 to 3, 14 to 17 *2 0 to 3, 14 to 17, 100 to 103, 114 to 117 *3	14
76	Fault code output selection	0 to 2	0
77	Parameter write selection	0 to 2	0
78	Reverse rotation prevention selection	0 to 2	0
79 *14	Operation mode selection	0 to 4, 6, 7	0
80	Motor capacity	0.4 to 55kW, 9999 *2 0 to 3600kW, 9999 *3	9999
81	Number of motor poles	2, 4, 6, 8, 10, 12, 9999	9999
82	Motor excitation current	0 to 500A, 9999 *2 0 to 3600A, 9999 *3	9999
83	Rated motor voltage	0 to 1000V	200/400V *7
84	Rated motor frequency	10 to 400Hz, 9999	9999
89	Speed control gain (Advanced magnetic flux vector)	0 to 200%, 9999	9999

Pr.	Name	Setting range	Initial value
90	Motor constant (R1)	0 to 50Ω, 9999 *2 0 to 400mΩ, 9999 *3	9999
91	Motor constant (R2)	0 to 50Ω, 9999 *2 0 to 400mΩ, 9999 *3	9999
92	Motor constant (L1)/d-shaft inductance (Ld)	0 to 6000mH, 9999 *2 0 to 400mH, 9999 *3	9999
93	Motor constant (L2)/q-shaft inductance (Lq)	0 to 6000mH, 9999 *2 0 to 400mH, 9999 *3	9999
94	Motor constant (X)	0 to 100%, 9999	9999
95	Online auto tuning selection	0 to 2	0
96	Auto tuning setting/ status	0, 1, 11, 101	0
100	V/F1(first frequency)	0 to 590Hz, 9999	9999
101	V/F1(first frequency voltage)	0 to 1000V	0V
102	V/F2(second frequency)	0 to 590Hz, 9999	9999
103	V/F2(second frequency voltage)	0 to 1000V	0V
104	V/F3(third frequency)	0 to 590Hz, 9999	9999
105	V/F3(third frequency voltage)	0 to 1000V	0V
106	V/F4(fourth frequency)	0 to 590Hz, 9999	9999
107	V/F4(fourth frequency voltage)	0 to 1000V	0V
108	V/F5(fifth frequency)	0 to 590Hz, 9999	9999
109	V/F5(fifth frequency voltage)	0 to 1000V	0V
110	Third acceleration/ deceleration time	0 to 3600s, 9999	9999
111	Third deceleration time	0 to 3600s, 9999	9999
112	Third torque boost	0 to 30%, 9999	9999
113	Third V/F (base frequency)	0 to 590Hz, 9999	9999
114	Third stall prevention operation level	0 to 400%	150%
115	Third stall prevention operation frequency	0 to 590Hz	0Hz
116	Third output frequency detection	0 to 590Hz	60/50Hz *10
117	PU communication station number	0 to 31	0
118	PU communication speed	48, 96, 192, 384, 576, 768, 1152	192
119	PU communication stop bit length / data length	0, 1, 10, 11	1
120	PU communication parity check	0 to 2	2
121	Number of PU communication retries	0 to 10, 9999	1
122	PU communication check time interval	0, 0.1 to 999.8s, 9999	9999
123	PU communication waiting time setting	0 to 150ms, 9999	9999
124	PU communication CR/ LF selection	0 to 2	1
125 *14	Terminal 2 frequency setting gain frequency	0 to 590Hz	60/50Hz *10
126 *14	Terminal 4 frequency setting gain frequency	0 to 590Hz	60/50Hz *10
127	PID control automatic switchover frequency	0 to 590Hz, 9999	9999
128	PID action selection	0, 10, 11, 20, 21, 40 to 43, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 1000, 1001, 1010, 1011, 2000, 2001, 2010, 2011	0
129	PID proportional band	0.1 to 1000%, 9999	100%
130	PID integral time	0.1 to 3600s, 9999	1s
131	PID upper limit	0 to 100%, 9999	9999
132	PID lower limit	0 to 100%, 9999	9999

Parameter list

Pr.	Name	Setting range	Initial value
133	PID action set point	0 to 100%, 9999	9999
134	PID differential time	0.01 to 10s, 9999	9999
135	Electronic bypass sequence selection	0, 1	0
136	MC switchover interlock time	0 to 100s	1s
137	Start waiting time	0 to 100s	0.5s
138	Bypass selection at a fault	0, 1	0
139	Automatic switchover frequency from inverter to bypass operation	0 to 60Hz, 9999	9999
140	Backlash acceleration stopping frequency	0 to 590Hz	1Hz
141	Backlash acceleration stopping time	0 to 360s	0.5s
142	Backlash deceleration stopping frequency	0 to 590Hz	1Hz
143	Backlash deceleration stopping time	0 to 360s	0.5s
144	Speed setting switchover	0, 2, 4, 6, 8, 10, 12, 102, 104, 106, 108, 110, 112	4
145	PU display language selection	0 to 7	1
147	Acceleration/deceleration time switching frequency	0 to 590Hz, 9999	9999
148	Stall prevention level at 0 V input	0 to 400%	150%
149	Stall prevention level at 10 V input	0 to 400%	200%
150	Output current detection level	0 to 400%	150%
151	Output current detection signal delay time	0 to 10s	0s
152	Zero current detection level	0 to 400%	5%
153	Zero current detection time	0 to 10s	0.5s
154	Voltage reduction selection during stall prevention operation	0, 1, 10, 11	1
155	RT signal function validity condition selection	0, 10	0
156	Stall prevention operation selection	0 to 31, 100, 101	0
157	OL signal output timer	0 to 25s, 9999	0s
158	AM terminal function selection	1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52 to 54, 61, 62, 67, 70, 87 to 90, 91 to 98	1
159	Automatic switchover frequency range from bypass to inverter operation	0 to 10Hz, 9999	9999
160 *15	User group read selection	0, 1, 9999	0
161	Frequency setting/key lock operation selection	0, 1, 10, 11	0
162	Automatic restart after instantaneous power failure selection	0 to 3, 10 to 13	0
163	First cushion time for restart	0 to 20s	0s
164	First cushion voltage for restart	0 to 100%	0%
165	Stall prevention operation level for restart	0 to 400%	150%
166	Output current detection signal retention time	0 to 10s, 9999	0.1s
167	Output current detection operation selection	0, 1, 10, 11	0
168	Parameter for manufacturer setting. Do not set.		
169			
170	Watt-hour meter clear	0, 10, 9999	9999
171	Operation hour meter clear	0, 9999	9999
172	User group registered display/batch clear	9999, (0 to 16)	0
173	User group registration	0 to 1999, 9999	9999
174	User group clear	0 to 1999, 9999	9999

Pr.	Name	Setting range	Initial value
178	STF terminal function selection	0 to 20, 22 to 28, 37, 42 to 47, 50, 51, 60 to 62, 64 to 74, 76 to 80, 87, 92, 93, 9999 *12	60
179	STR terminal function selection		61
180	RL terminal function selection		0
181	RM terminal function selection		1
182	RH terminal function selection		2
183	RT terminal function selection		3
184	AU terminal function selection		4
185	JOG terminal function selection		5
186	CS terminal function selection		6
187	MRS terminal function selection		24
188	STOP terminal function selection		25
189	RES terminal function selection		62
190	RUN terminal function selection	0 to 8, 10 to 20, 22, 25 to 28, 30 to 36, 38 to 54, 56, 57, 60, 61, 63, 64, 68, 70, 79, 84, 85, 90 to 99, 100 to 108, 110 to 116, 120, 122, 125 to 128, 130 to 136, 138 to 154, 156, 157, 160, 161, 163, 164, 168, 170, 179, 184, 185, 190 to 199, 200 to 208, 300 to 308, 9999 *13	0
191	SU terminal function selection		1
192	IPF terminal function selection		2
193	OL terminal function selection		3
194	FU terminal function selection		4
195	ABC1 terminal function selection		99
196	ABC2 terminal function selection		9999
232 to 239	Multi-speed setting (8 speed to 15 speed)	0 to 590Hz, 9999	9999
240	Soft-PWM operation selection	0, 1	1
241	Analog input display unit switchover	0, 1	0
242	Terminal 1 added compensation amount (terminal 2)	0 to 100%	100%
243	Terminal 1 added compensation amount (terminal 4)	0 to 100%	75%
244	Cooling fan operation selection	0, 1, 101 to 105	1
245	Rated slip	0 to 50%, 9999	9999
246	Slip compensation time constant	0.01 to 10s	0.5s
247	Constant-power range slip compensation selection	0, 9999	9999
248	Self power management selection	0 to 2	0
249	Earth (ground) fault detection at start	0, 1	0
250	Stop selection	0 to 100s, 1000 to 1100s, 8888, 9999	9999
251	Output phase loss protection selection	0, 1	1
252	Override bias	0 to 200%	50%
253	Override gain	0 to 200%	150%
254	Main circuit power OFF waiting time	0 to 3600s, 9999	600s
255	Life alarm status display	(0 to 15)	0
256	Inrush current limit circuit life display	(0 to 100%)	100%
257	Control circuit capacitor life display	(0 to 100%)	100%
258	Main circuit capacitor life display	(0 to 100%)	100%
259	Main circuit capacitor life measuring	0, 1	0
260	PWM frequency automatic switchover	0, 1	1
261	Power failure stop selection	0 to 2, 11, 12, 21, 22	0
262	Subtracted frequency at deceleration start	0 to 20Hz	3Hz
263	Subtraction starting frequency	0 to 590Hz, 9999	60/50Hz *10
264	Power-failure deceleration time 1	0 to 3600s	5s
265	Power-failure deceleration time 2	0 to 3600s, 9999	9999
266	Power failure deceleration time switchover frequency	0 to 590Hz	60/50Hz *10
267	Terminal 4 input selection	0 to 2	0

Pr.	Name	Setting range	Initial value
268	Monitor decimal digits selection	0, 1, 9999	9999
269	Parameter for manufacturer setting. Do not set.		
270	Stop-on contact/load torque high-speed frequency control selection	0 to 3, 11, 13	0
271	High-speed setting maximum current	0 to 400%	50%
272	Middle-speed setting minimum current	0 to 400%	100%
273	Current averaging range	0 to 590Hz, 9999	9999
274	Current averaging filter time constant	1 to 4000	16
275	Stop-on contact excitation current low-speed multiplying factor	50 to 300%, 9999	9999
276	PWM carrier frequency at stop-on contact	0 to 9, 9999 *2 0 to 4, 9999 *3	9999
278	Brake opening frequency	0 to 30Hz	3Hz
279	Brake opening current	0 to 400%	130%
280	Brake opening current detection time	0 to 2s	0.3s
281	Brake operation time at start	0 to 5s	0.3s
282	Brake operation frequency	0 to 30Hz	6Hz
283	Brake operation time at stop	0 to 5s	0.3s
284	Deceleration detection function selection	0, 1	0
285	Overspeed detection frequency (Excessive speed deviation detection frequency)	0 to 30Hz, 9999	9999
286	Droop gain	0 to 100%	0%
287	Droop filter time constant	0 to 1s	0.3s
288	Droop function activation selection	0 to 2, 10, 11	0
289	Inverter output terminal filter	5 to 50ms, 9999	9999
290	Monitor negative output selection	0 to 7	0
291	Pulse train I/O selection	0, 1, 10, 11, 20, 21, 100 (FM type) 0, 1 (CA type)	0
292	Automatic acceleration/deceleration	0, 1, 3, 5 to 8, 11	0
293	Acceleration/deceleration separate selection	0 to 2	0
294	UV avoidance voltage gain	0 to 200%	100%
295	Frequency change increment amount setting	0, 0.01, 0.10, 1.00, 10.00	0
296	Password lock level	0 to 6, 99, 100 to 106, 199, 9999	9999
297	Password lock/unlock	(0 to 5), 1000 to 9998, 9999	9999
298	Frequency search gain	0 to 32767, 9999	9999
299	Rotation direction detection selection at restarting	0, 1, 9999	0
331	RS-485 communication station number	0 to 31(0 to 247)	0
332	RS-485 communication speed	3, 6, 12, 24, 48, 96, 192, 384, 576, 768, 1152	96
333	RS-485 communication stop bit length / data length	0, 1, 10, 11	1
334	RS-485 communication parity check selection	0 to 2	2
335	RS-485 communication retry count	0 to 10, 9999	1
336	RS-485 communication check time interval	0 to 999.8s, 9999	0s
337	RS-485 communication waiting time setting	0 to 150ms, 9999	9999
338	Communication operation command source	0, 1	0
339	Communication speed command source	0 to 2	0
340	Communication startup mode selection	0 to 2, 10, 12	0
341	RS-485 communication CR/LF selection	0 to 2	1
342	Communication EEPROM write selection	0, 1	0
343	Communication error count	—	0
350 *8	Stop position command selection	0, 1, 9999	9999
351 *8	Orientation speed	0 to 30Hz	2Hz

Pr.	Name	Setting range	Initial value
352 *8	Creep speed	0 to 10Hz	0.5Hz
353 *8	Creep switchover position	0 to 16383	511
354 *8	Position loop switchover position	0 to 8191	96
355 *8	DC injection brake start position	0 to 255	5
356 *8	Internal stop position command	0 to 16383	0
357 *8	Orientation in-position zone	0 to 255	5
358 *8	Servo torque selection	0 to 13	1
359 *8	Encoder rotation direction	0, 1, 100, 101	1
360 *8	16-bit data selection	0 to 127	0
361 *8	Position shift	0 to 16383	0
362 *8	Orientation position loop gain	0.1 to 100	1
363 *8	Completion signal output delay time	0 to 5s	0.5s
364 *8	Encoder stop check time	0 to 5s	0.5s
365 *8	Orientation limit	0 to 60s, 9999	9999
366 *8	Recheck time	0 to 5s, 9999	9999
367 *8	Speed feedback range	0 to 590Hz, 9999	9999
368 *8	Feedback gain	0 to 100	1
369 *8	Number of encoder pulses	0 to 4096	1024
374	Overspeed detection level	0 to 590Hz, 9999	9999
376 *8	Encoder signal loss detection enable/ disable selection	0, 1	0
380	Acceleration S-pattern 1	0 to 50%	0
381	Deceleration S-pattern 1	0 to 50%	0
382	Acceleration S-pattern 2	0 to 50%	0
383	Deceleration S-pattern 2	0 to 50%	0
384	Input pulse division scaling factor	0 to 250	0
385	Frequency for zero input pulse	0 to 590Hz	0
386	Frequency for maximum input pulse	0 to 590Hz	60/50Hz *10
393 *8	Orientation selection	0 to 2	0
396 *8	Orientation speed gain (P term)	0 to 1000	60
397 *8	Orientation speed integral time	0 to 20s	0.333s
398 *8	Orientation speed gain (D term)	0 to 100	1
399 *8	Orientation deceleration ratio	0 to 1000	20
414	PLC function operation selection	0 to 2	0
415	Inverter operation lock mode setting	0, 1	0
416	Pre-scale function selection	0 to 5	0
417	Pre-scale setting value	0 to 32767	1
419	Position command source selection	0, 2	0
420	Command pulse scaling factor numerator (electronic gear numerator)	1 to 32767	1
421	Command pulse multiplication denominator (electronic gear denominator)	1 to 32767	1
422	Position control gain	0 to 150sec^{-1}	25sec^{-1}
423	Position feed forward gain	0 to 100%	0%
424	Position command acceleration/ deceleration time constant	0 to 50s	0s
425	Position feed forward command filter	0 to 5s	0s
426	In-position width	0 to 32767 pulse	100 pulse
427	Excessive level error	0 to 400K pulse, 9999	40K pulse
428	Command pulse selection	0 to 5	0
429	Clear signal selection	0, 1	1
430	Pulse monitor selection	0 to 5, 100 to 105, 1000 to 1005, 1100 to 1105, 8888, 9999	9999
446	Model position control gain	0 to 150sec^{-1}	25sec^{-1}
450	Second applied motor	0, 1, 3 to 6, 13 to 16, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 70, 73, 74, 330, 333, 334, 8090, 8093, 8094, 9090, 9093, 9094, 9999	9999

Pr.	Name	Setting range	Initial value
451	Second motor control method selection	10 to 14, 20, 110 to 114, 9999	9999
453	Second motor capacity	0.4 to 55kW, 9999 *2 0 to 3600kW, 9999 *3	9999
454	Number of second motor poles	2, 4, 6, 8, 10, 12, 9999	9999
455	Second motor excitation current	0 to 500A, 9999 *2 0 to 3600A, 9999 *3	9999
456	Rated second motor voltage	0 to 1000V	200/400V *7
457	Rated second motor frequency	10 to 400Hz, 9999	9999
458	Second motor constant (R1)	0 to 50Ω, 9999 *2 0 to 400mΩ, 9999 *3	9999
459	Second motor constant (R2)	0 to 50Ω, 9999 *2 0 to 400mΩ, 9999 *3	9999
460	Second motor constant (L1) / d-shaft inductance (Ld)	0 to 6000mH, 9999 *2 0 to 400mH, 9999 *3	9999
461	Second motor constant (L2) / q-shaft inductance (Lq)	0 to 6000mH, 9999 *2 0 to 400mH, 9999 *3	9999
462	Second motor constant (X)	0 to 100%, 9999	9999
463	Second motor auto tuning setting/status	0, 1, 11, 101	0
464	Digital position control sudden stop deceleration time	0 to 360s	0
465	First target position lower 4 digits	0 to 9999	0
466	First target position upper 4 digits		0
467	Second target position lower 4 digits		0
468	Second target position upper 4 digits		0
469	Third target position lower 4 digits		0
470	Third target position upper 4 digits		0
471	Fourth target position lower 4 digits		0
472	Fourth target position upper 4 digits		0
473	Fifth target position lower 4 digits		0
474	Fifth target position upper 4 digits		0
475	Sixth target position lower 4 digits		0
476	Sixth target position upper 4 digits		0
477	Seventh target position lower 4 digits		0
478	Seventh target position upper 4 digits		0
479	Eighth target position lower 4 digits		0
480	Eighth target position upper 4 digits		0
481	Ninth target position lower 4 digits		0
482	Ninth target position upper 4 digits		0
483	Tenth target position lower 4 digits		0
484	Tenth target position upper 4 digits		0
485	Eleventh target position lower 4 digits		0
486	Eleventh target position upper 4 digits		0
487	Twelfth target position lower 4 digits		0
488	Twelfth target position upper 4 digits		0
489	Thirteenth target position lower 4 digits		0
490	Thirteenth target position upper 4 digits		0
491	Fourteenth target position lower 4 digits		0
492	Fourteenth target position upper 4 digits		0
493	Fifteenth target position lower 4 digits		0
494	Fifteenth target position upper 4 digits		0
495	Remote output selection	0, 1, 10, 11	0
496	Remote output data 1	0 to 4095	0

Pr.	Name	Setting range	Initial value
497	Remote output data 2	0 to 4095	0
498	PLC function flash memory clear	0 to 9999	0
502	Stop mode selection at communication error	0 to 3	0
503	Maintenance timer 1	0(1 to 9998)	0
504	Maintenance timer 1 warning output set time	0 to 9998, 9999	9999
505	Speed setting reference	1 to 590Hz	60/50Hz *10
516	S-pattern time at a start of acceleration	0.1 to 2.5s	0.1s
517	S-pattern time at a completion of acceleration	0.1 to 2.5s	0.1s
518	S-pattern time at a start of deceleration	0.1 to 2.5s	0.1s
519	S-pattern time at a completion of deceleration	0.1 to 2.5s	0.1s
522	Output stop frequency	0 to 590Hz, 9999	9999
539	Modbus-RTU communication check time interval	0 to 999.8s, 9999	9999
547	USB communication station number	0 to 31	0
548	USB communication check time interval	0 to 999.8s, 9999	9999
549	Protocol selection	0, 1	0
550	NET mode operation command source selection	0, 1, 9999	9999
551	PU mode operation command source selection	1 to 3, 9999	9999
552	Frequency jump range	0 to 30Hz, 9999	9999
553	PID deviation limit	0 to 100%, 9999	9999
554	PID signal operation selection	0 to 3, 10 to 13	0
555	Current average time	0.1 to 1.0s	1s
556	Data output mask time	0 to 20s	0s
557	Current average value monitor signal output reference current	0 to 500A *2 0 to 3600A *3	Rated inverter current
560	Second frequency search gain	0 to 32767, 9999	9999
561	PTC thermistor protection level	0.5 to 30kΩ, 9999	9999
563	Energization time carrying-over times	(0 to 65535)	0
564	Operating time carrying-over times	(0 to 65535)	0
569	Second motor speed control gain	0 to 200%, 9999	9999
570	Multiple rating setting	0 to 3	2
571	Holding time at a start	0 to 10s, 9999	9999
573	4 mA input check selection	1 to 4, 9999	9999
574	Second motor online auto tuning	0, 1	0
575	Output interruption detection time	0 to 3600s, 9999	1s
576	Output interruption detection level	0 to 590Hz	0Hz
577	Output interruption cancel level	900 to 1100%	1000%
592	Traverse function selection	0 to 2	0
593	Maximum amplitude amount	0 to 25%	10%
594	Amplitude compensation amount during deceleration	0 to 50%	10%
595	Amplitude compensation amount during acceleration	0 to 50%	10%
596	Amplitude acceleration time	0.1 to 3600s	5s
597	Amplitude deceleration time	0.1 to 3600s	5s
598 *15	Undervoltage level	350 to 430V, 9999	9999
599	X10 terminal input selection	0,1	0
600	First free thermal reduction frequency 1	0 to 590Hz, 9999	9999
601	First free thermal reduction ratio 1	1 to 100%	100%
602	First free thermal reduction frequency 2	0 to 590Hz, 9999	9999
603	First free thermal reduction ratio 2	1 to 100%	100%
604	First free thermal reduction frequency 3	0 to 590Hz, 9999	9999
609	PID set point/deviation input selection	1 to 5	2
610	PID measured value input selection	1 to 5	3

Pr.	Name	Setting range	Initial value
611	Acceleration time at a restart	0 to 3600s, 9999	9999
639	Brake opening current selection	0, 1	0
640	Brake operation frequency selection	0, 1	0
641	Second brake sequence operation selection	0, 7, 8, 9999	0
642	Second brake opening frequency	0 to 30Hz	3Hz
643	Second brake opening current	0 to 400%	130%
644	Second brake opening current detection time	0 to 2s	0.3s
645	Second brake operation time at start	0 to 5s	0.3s
646	Second brake operation frequency	0 to 30Hz	6Hz
647	Second brake operation time at stop	0 to 5s	0.3s
648	Second deceleration detection function selection	0, 1	0
650	Second brake opening current selection	0, 1	0
651	Second brake operation frequency selection	0, 1	0
653	Speed smoothing control	0 to 200%	0
654	Speed smoothing cutoff frequency	0 to 120Hz	20Hz
655	Analog remote output selection	0, 1, 10, 11	0
656	Analog remote output 1	800 to 1200%	1000%
657	Analog remote output 2		1000%
658	Analog remote output 3		1000%
659	Analog remote output 4		1000%
660	Increased magnetic excitation deceleration operation selection	0, 1	0
661	Magnetic excitation increase rate	0 to 40%, 9999	9999
662	Increased magnetic excitation current level	0 to 300%	100%
665	Regeneration avoidance frequency gain	0 to 200%	100%
668	Power failure stop frequency gain	0 to 200%	100%
684	Tuning data unit switchover	0, 1	0
686	Maintenance timer 2	0(1 to 9998)	0
687	Maintenance timer 2 warning output set time	0 to 9998, 9999	9999
688	Maintenance timer 3	0(1 to 9998)	0
689	Maintenance timer 3 warning output set time	0 to 9998, 9999	9999
690	Deceleration check time	0 to 3600s, 9999	1s
692	Second free thermal reduction frequency 1	0 to 590Hz, 9999	9999
693	Second free thermal reduction ratio 1	1 to 100%	100%
694	Second free thermal reduction frequency 2	0 to 590Hz, 9999	9999
695	Second free thermal reduction ratio 2	1 to 100%	100%
696	Second free thermal reduction frequency 3	0 to 590Hz, 9999	9999
699	Input terminal filter	5 to 50ms, 9999	9999
702	Maximum motor frequency	0 to 400Hz, 9999	9999
706	Induced voltage constant (Φf)	0 to 5000mV/(rad/s), 9999	9999
707	Motor inertia (integer)	10 to 999, 9999	9999
711	Motor Ld decay ratio	0 to 100%, 9999	9999
712	Motor Lq decay ratio	0 to 100%, 9999	9999
717	Starting resistance tuning compensation	0 to 200%, 9999	9999
721	Starting magnetic pole position detection pulse width	0 to 6000μs, 10000 to 16000μs, 9999	9999
724	Motor inertia (exponent)	0 to 7, 9999	9999
725	Motor protection current level	100 to 500%, 9999	9999
738	Second motor induced voltage constant (phi f)	0 to 5000mV/(rad/s), 9999	9999
739	Second motor Ld decay ratio	0 to 100%, 9999	9999
740	Second motor Lq decay ratio	0 to 100%, 9999	9999
741	Second starting resistance tuning compensation	0 to 200%, 9999	9999

Pr.	Name	Setting range	Initial value
742	Second motor magnetic pole detection pulse width	0 to 6000μs, 10000 to 16000μs, 9999	9999
743	Second motor maximum frequency	0 to 400Hz, 9999	9999
744	Second motor inertia (integer)	10 to 999, 9999	9999
745	Second motor inertia (exponent)	0 to 7, 9999	9999
746	Second motor protection current level	100 to 500%, 9999	9999
747	Second motor low-speed range torque characteristics	0, 9999	9999
753	Second PID action selection	0, 10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101, 1000, 1001, 1010, 1011, 2000, 2001, 2010, 2011	0
754	Second PID control automatic switchover frequency	0 to 590Hz, 9999	9999
755	Second PID action set point	0 to 100%, 9999	9999
756	Second PID proportional band	0.1 to 1000%, 9999	100%
757	Second PID integral time	0.1 to 3600s, 9999	1s
758	Second PID differential time	0.01 to 10.00s, 9999	9999
759	PID unit selection	0 to 43, 9999	9999
760	Pre-charge fault selection	0, 1	0
761	Pre-charge ending level	0 to 100%, 9999	9999
762	Pre-charge ending time	0 to 3600s, 9999	9999
763	Pre-charge upper detection level	0 to 100%, 9999	9999
764	Pre-charge time limit	0 to 3600s, 9999	9999
765	Second pre-charge fault selection	0, 1	0
766	Second pre-charge ending level	0 to 100%, 9999	9999
767	Second pre-charge ending time	0 to 3600s, 9999	9999
768	Second pre-charge upper detection level	0 to 100%, 9999	9999
769	Second pre-charge time limit	0 to 3600s, 9999	9999
774	Operation panel monitor selection 1	1 to 3, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 98, 100, 9999	9999
775	Operation panel monitor selection 2		9999
776	Operation panel monitor selection 3		9999
777	4 mA input fault operation frequency	0 to 590Hz, 9999	9999
778	Current input check filter	0 to 10s	0s
779	Operation frequency during communication error	0 to 590Hz, 9999	9999
788	Low speed range torque characteristic selection	0, 9999	9999
791	Acceleration time in low-speed range	0 to 3600s, 9999	9999
792	Deceleration time in low-speed range	0 to 3600s, 9999	9999
799	Pulse increment setting for output power	0.1, 1, 10, 100, 1000kWh	1kWh
800	Control method selection	0 to 6, 9 to 14, 20, 100 to 106, 109 to 114	20
802	Pre-excitation selection	0, 1	0
803	Constant power range torque characteristic selection	0, 1, 10, 11	0
804	Torque command source selection	0, 1, 3 to 6	0
805	Torque command value (RAM)	600 to 1400%	1000%
806	Torque command value (RAM,EEPROM)	600 to 1400%	1000%
807	Speed limit selection	0 to 2	0
808	Forward rotation speed limit/speed limit	0 to 400Hz	60/50Hz *10
809	Reverse rotation speed limit/reverse-side speed limit	0 to 400Hz, 9999	9999
810	Torque limit input method selection	0, 1	0
811	Set resolution switchover	0, 1, 10, 11	0
812	Torque limit level (regeneration)	0 to 400%, 9999	9999

Pr.	Name	Setting range	Initial value
813	Torque limit level (3rd quadrant)	0 to 400%, 9999	9999
814	Torque limit level (4th quadrant)		9999
815	Torque limit level 2		9999
816	Torque limit level during acceleration		9999
817	Torque limit level during deceleration		9999
818	Easy gain tuning response level setting	1 to 15	2
819	Easy gain tuning selection	0 to 2	0
820	Speed control P gain 1	0 to 1000%	60%
821	Speed control integral time 1	0 to 20s	0.333s
822	Speed setting filter 1	0 to 5s, 9999	9999
823 *8	Speed detection filter 1	0 to 0.1s	0.001s
824	Torque control P gain 1 (current loop proportional gain)	0 to 500%	100%
825	Torque control integral time 1 (current loop integral time)	0 to 500ms	5ms
826	Torque setting filter 1	0 to 5s, 9999	9999
827	Torque detection filter 1	0 to 0.1s	0s
828	Model speed control gain	0 to 1000%	60%
830	Speed control P gain 2	0 to 1000%, 9999	9999
831	Speed control integral time 2	0 to 20s, 9999	9999
832	Speed setting filter 2	0 to 5s, 9999	9999
833 *8	Speed detection filter 2	0 to 0.1s, 9999	9999
834	Torque control P gain 2	0 to 500%, 9999	9999
835	Torque control integral time 2	0 to 500ms, 9999	9999
836	Torque setting filter 2	0 to 5s, 9999	9999
837	Torque detection filter 2	0 to 0.1s, 9999	9999
840 *8	Torque bias selection	0 to 3, 24, 25, 9999	9999
841 *8	Torque bias 1	600 to 1400%, 9999	9999
842 *8	Torque bias 2	600 to 1400%, 9999	9999
843 *8	Torque bias 3	600 to 1400%, 9999	9999
844 *8	Torque bias filter	0 to 5s, 9999	9999
845 *8	Torque bias operation time	0 to 5s, 9999	9999
846 *8	Torque bias balance compensation	0 to 10V, 9999	9999
847 *8	Fall-time torque bias terminal 1 bias	0 to 400%, 9999	9999
848 *8	Fall-time torque bias terminal 1 gain	0 to 400%, 9999	9999
849	Analog input offset adjustment	0 to 200%	100%
850	Brake operation selection	0 to 2	0
853 *8	Speed deviation time	0 to 100s	1s
854	Excitation ratio	0 to 100%	100%
858	Terminal 4 function assignment	0, 1, 4, 9999	0
859	Torque current/Rated PM motor current	0 to 500A, 9999 *2	9999
		0 to 3600A, 9999 *3	
860	Second motor torque current/Rated PM motor current	0 to 500A, 9999 *2	9999
		0 to 3600A, 9999 *3	
864	Torque detection	0 to 400%	150%
865	Low speed detection	0 to 590Hz	1.5Hz
866	Torque monitoring reference	0 to 400%	150%
867	AM output filter	0 to 5s	0.01s
868	Terminal 1 function assignment	0 to 6, 9999	0
869 *11	Current output filter	0 to 5s	0.02s
870	Speed detection hysteresis	0 to 5Hz	0Hz
872	Input phase loss protection selection	0, 1	0
873 *8	Speed limit	0 to 400Hz	20Hz
874	OLT level setting	0 to 400%	150%
875	Fault definition	0, 1	0
877	Speed feed forward control/model adaptive speed control selection	0 to 2	0
878	Speed feed forward filter	0 to 1s	0s
879	Speed feed forward torque limit	0 to 400%	150%
880	Load inertia ratio	0 to 200 times	7 times

Pr.	Name	Setting range	Initial value
881	Speed feed forward gain	0 to 1000%	0%
882	Regeneration avoidance operation selection	0 to 2	0
883	Regeneration avoidance operation level	300 to 800V	DC380/ DC760V *7
884	Regeneration avoidance at deceleration detection sensitivity	0 to 5	0
885	Regeneration avoidance compensation frequency limit value	0 to 590Hz, 9999	6Hz
886	Regeneration avoidance voltage gain	0 to 200%	100%
888	Free parameter 1	0 to 9999	9999
889	Free parameter 2	0 to 9999	9999
891	Cumulative power monitor digit shifted times	0 to 4, 9999	9999
892	Load factor	30 to 150%	100%
893	Energy saving monitor reference (motor capacity)	0.1 to 55kW *2 0 to 3600kW *3	Rated inverter capacity
894	Control selection during commercial power-supply operation	0 to 3	0
895	Power saving rate reference value	0, 1, 9999	9999
896	Power unit cost	0 to 500, 9999	9999
897	Power saving monitor average time	0, 1 to 1000h, 9999	9999
898	Power saving cumulative monitor clear	0, 1, 10, 9999	9999
899	Operation time rate (estimated value)	0 to 100%, 9999	9999
C0 (900) *9	FM/CA terminal calibration *10	—	—
C1 (901) *9	AM terminal calibration	—	—
C2 (902) *9	Terminal 2 frequency setting bias frequency	0 to 590Hz	0Hz
C3 (902) *9	Terminal 2 frequency setting bias	0 to 300%	0%
125 (903) *9	Terminal 2 frequency setting gain frequency	0 to 590Hz	60/50Hz *10
C4 (903) *9	Terminal 2 frequency setting gain	0 to 300%	100%
C5 (904) *9	Terminal 4 frequency setting bias frequency	0 to 590Hz	0Hz
C6 (904) *9	Terminal 4 frequency setting bias	0 to 300%	20%
126 (905) *9	Terminal 4 frequency setting gain frequency	0 to 590Hz	60/50Hz *10
C7 (905) *9	Terminal 4 frequency setting gain	0 to 300%	100%
C12 (917) *9	Terminal 1 bias frequency (speed)	0 to 590Hz	0Hz
C13 (917) *9	Terminal 1 bias (speed)	0 to 300%	0%
C14 (918) *9	Terminal 1 gain frequency (speed)	0 to 590Hz	60/50Hz *10
C15 (918) *9	Terminal 1 gain (speed)	0 to 300%	100%
C16 (919) *9	Terminal 1 bias command (torque/ magnetic flux)	0 to 400%	0%
C17 (919) *9	Terminal 1 bias (torque/ magnetic flux)	0 to 300%	0%
C18 (920) *9	Terminal 1 gain command (torque/ magnetic flux)	0 to 400%	150%
C19 (920) *9	Terminal 1 gain (torque/ magnetic flux)	0 to 300%	100%
C8 (930) *9,*11	Current output bias signal	0 to 100%	0%
C9 (930) *9,*11	Current output bias current	0 to 100%	0%
C10 (931) *9,*11	Current output gain signal	0 to 100%	100%
C11 (931) *9,*11	Current output gain current	0 to 100%	100%
C38 (932) *9	Terminal 4 bias command (torque/ magnetic flux)	0 to 400%	0%
C39 (932) *9	Terminal 4 bias (torque/ magnetic flux)	0 to 300%	20%
C40 (933) *9	Terminal 4 gain command (torque/ magnetic flux)	0 to 400%	150%
C41 (933) *9	Terminal 4 gain (torque/ magnetic flux)	0 to 300%	100%
C42 (934) *9	PID display bias coefficient	0 to 500.00, 9999	9999
C43 (934) *9	PID display bias analog value	0 to 300%	20%

Pr.	Name	Setting range	Initial value
C44 (935) *9	PID display gain coefficient	0 to 500.00, 9999	9999
C45 (935) *9	PID display gain analog value	0 to 300%	100%
977	Input voltage mode selection	0, 1	0
989	Parameter copy alarm release	10 *2 100 *3	10 *2 100 *3
990	PU buzzer control	0, 1	1
991	PU contrast adjustment	0 to 63	58
992	Operation panel setting dial push monitor selection	0 to 3, 5 to 14, 17 to 20, 22 to 35, 38, 40 to 45, 50 to 57, 61, 62, 64, 67, 87 to 97, 100	0
994	Droop break point gain	0.1 to 100%, 9999	9999
995	Droop break point torque	0.1 to 100%	100%
997	Fault initiation	0 to 255, 9999	9999
998	PM parameter initialization	0, 3003, 3103, 8009, 8109, 9009, 9109	0
999	Automatic parameter setting	1, 2,10 to 13, 20, 21, 9999	9999
1002	Lq tuning target current adjustment coefficient	50 to 150%, 9999	9999
1003	Notch filter frequency	0, 8 to 1250Hz	0
1004	Notch filter depth	0 to 3	0
1005	Notch filter width	0 to 3	0
1006	Clock (year)	2000 to 2099	2000
1007	Clock (month, day)	101 to 131, 201 to 229, 301 to 331, 401 to 430, 501 to 531, 601 to 630, 701 to 731, 801 to 831, 901 to 930, 1001 to 1031, 1101 to 1130, 1201 to 1231	101
1008	Clock (hour, minute)	0 to 59, 100 to 159, 200 to 259, 300 to 359, 400 to 459, 500 to 559, 600 to 659, 700 to 759, 800 to 859, 900 to 959, 1000 to 1059, 1100 to 1159, 1200 to 1259, 1300 to 1359, 1400 to 1459, 1500 to 1559, 1600 to 1659, 1700 to 1759, 1800 to 1859, 1900 to 1959, 2000 to 2059, 2100 to 2159, 2200 to 2259, 2300 to 2359	0
1020	Trace operation selection	0 to 4	0
1021	Trace mode selection	0 to 2	0
1022	Sampling cycle	0 to 9	2
1023	Number of analog channels	1 to 8	4
1024	Sampling auto start	0, 1	0
1025	Trigger mode selection	0 to 4	0
1026	Number of sampling before trigger	0 to 100%	90%
1027	Analog source selection (1ch)	1 to 3, 5 to 14, 17 to 20, 22 to 24, 32 to 35, 40 to 42, 52 to 54, 61, 62, 64, 67, 87 to 98, 201 to 213, 222 to 227, 230 to 238, 240 to 247 251 to 254	201
1028	Analog source selection (2ch)		202
1029	Analog source selection (3ch)		203
1030	Analog source selection (4ch)		204
1031	Analog source selection (5ch)		205
1032	Analog source selection (6ch)		206
1033	Analog source selection (7ch)		207
1034	Analog source selection (8ch)		208
1035	Analog trigger channel	1 to 8	1
1036	Analog trigger operation selection	0, 1	0
1037	Analog trigger level	600 to 1400	1000

Pr.	Name	Setting range	Initial value
1038	Digital source selection (1ch)	1 to 255	1
1039	Digital source selection (2ch)		2
1040	Digital source selection (3ch)		3
1041	Digital source selection (4ch)		4
1042	Digital source selection (5ch)		5
1043	Digital source selection (6ch)		6
1044	Digital source selection (7ch)		7
1045	Digital source selection (8ch)		8
1046	Digital trigger channel	1 to 8	1
1047	Digital trigger operation selection	0, 1	0
1048	Display-off waiting time	0 to 60min	0min
1049	USB host reset	0, 1	0
1072	DC brake judgment time for vibration control operation	0 to 10s	3s
1073	Vibration control operation selection	0, 1	0
1074	Vibration suppression frequency	0.05 to 3Hz, 9999	1Hz
1075	Vibration suppression depth	0 to 3	0
1076	Vibration suppression width	0 to 3	0
1077	Rope length	0.1 to 50m	1m
1078	Trolley weight	1 to 50000Kg	1Kg
1079	Load weight	1 to 50000Kg	1Kg
1103	Deceleration time at emergency stop	0 to 3600s	5s
1106	Torque monitor filter	0 to 5s, 9999	9999
1107	Running speed monitor filter	0 to 5s, 9999	9999
1108	Excitation current monitor filter	0 to 5s, 9999	9999
1113	Speed limit method selection	0 to 2, 10, 9999	9999
1114	Torque command reverse selection	0, 1	1
1115	Speed control integral term clear time	0 to 9998ms	0s
1116	Constant output range speed control P gain compensation	0 to 100%	0%
1117	Speed control P gain 1 (per-unit system)	0 to 300, 9999	9999
1118	Speed control P gain 2 (per-unit system)	0 to 300, 9999	9999
1119	Model speed control gain (per-unit system)	0 to 300, 9999	9999
1121	Per-unit speed control reference frequency	0 to 400 Hz	120Hz *2 60Hz *3
1134	PID upper limit manipulated value	0 to 100%	100%
1135	PID lower limit manipulated value	0 to 100%	100%
1136	Second PID display bias coefficient	0 to 500, 9999	9999
1137	Second PID display bias analog value	0 to 300%	20%
1138	Second PID display gain coefficient	0 to 500, 9999	9999
1139	Second PID display gain analog value	0 to 300%	100%
1140	Second PID set point/ deviation input selection	1 to 5	2
1141	Second PID measured value input selection	1 to 5	3
1142	Second PID unit selection	0 to 43, 9999	9999
1143	Second PID upper limit	0 to 100%, 9999	9999
1144	Second PID lower limit	0 to 100%, 9999	9999
1145	Second PID deviation limit	0.0 to 100.0%, 9999	9999
1146	Second PID signal operation selection	0 to 3, 10 to 13	0
1147	Second output interruption detection time	0 to 3600s, 9999	1s
1148	Second output interruption detection level	0 to 590Hz	0Hz
1149	Second output interruption cancel level	900 to 1100%	1000%
1150 to 1199	User parameters 1 to 50	0 to 65535	0
1220	Target position/speed selection	0 to 2	0

Pr.	Name	Setting range	Initial value
1221	Start command edge detection selection	0, 1	0
1222	First positioning acceleration time	0.01 to 360s	5s
1223	First positioning deceleration time	0.01 to 360s	5s
1224	First positioning dwell time	0 to 20000ms	0ms
1225	First positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1226	Second positioning acceleration time	0.01 to 360s	5s
1227	Second positioning deceleration time	0.01 to 360s	5s
1228	Second positioning dwell time	0 to 20000ms	0ms
1229	Second positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1230	Third positioning acceleration time	0.01 to 360s	5s
1231	Third positioning deceleration time	0.01 to 360s	5s
1232	Third positioning dwell time	0 to 20000ms	0ms
1233	Third positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1234	Fourth positioning acceleration time	0.01 to 360s	5s
1235	Fourth positioning deceleration time	0.01 to 360s	5s
1236	Fourth positioning dwell time	0 to 20000ms	0ms
1237	Fourth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1238	Fifth positioning acceleration time	0.01 to 360s	5s
1239	Fifth positioning deceleration time	0.01 to 360s	5s
1240	Fifth positioning dwell time	0 to 20000ms	0ms
1241	Fifth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1242	Sixth positioning acceleration time	0.01 to 360s	5s
1243	Sixth positioning deceleration time	0.01 to 360s	5s
1244	Sixth positioning dwell time	0 to 20000ms	0ms
1245	Sixth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1246	Seventh positioning acceleration time	0.01 to 360s	5s
1247	Seventh positioning deceleration time	0.01 to 360s	5s
1248	Seventh positioning dwell time	0 to 20000ms	0ms
1249	Seventh positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1250	Eighth positioning acceleration time	0.01 to 360s	5s
1251	Eighth positioning deceleration time	0.01 to 360s	5s
1252	Eighth positioning dwell time	0 to 20000ms	0ms
1253	Eighth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1254	Ninth positioning acceleration time	0.01 to 360s	5s
1255	Ninth positioning deceleration time	0.01 to 360s	5s
1256	Ninth positioning dwell time	0 to 20000ms	0ms
1257	Ninth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1258	Tenth positioning acceleration time	0.01 to 360s	5s
1259	Tenth positioning deceleration time	0.01 to 360s	5s
1260	Tenth positioning dwell time	0 to 20000ms	0ms
1261	Tenth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1262	Eleventh positioning acceleration time	0.01 to 360s	5s
1263	Eleventh positioning deceleration time	0.01 to 360s	5s
1264	Eleventh positioning dwell time	0 to 20000ms	0ms
1265	Eleventh positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1266	Twelfth positioning acceleration time	0.01 to 360s	5s
1267	Twelfth positioning deceleration time	0.01 to 360s	5s
1268	Twelfth positioning dwell time	0 to 20000ms	0ms
1269	Twelfth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1270	Thirteenth positioning acceleration time	0.01 to 360s	5s
1271	Thirteenth positioning deceleration time	0.01 to 360s	5s
1272	Thirteenth positioning dwell time	0 to 20000ms	0ms
1273	Thirteenth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1274	Fourteenth positioning acceleration time	0.01 to 360s	5s
1275	Fourteenth positioning deceleration time	0.01 to 360s	5s
1276	Fourteenth positioning dwell time	0 to 20000ms	0ms
1277	Fourteenth positioning sub-function	0, 1, 10, 11, 100, 101, 110, 111	10
1278	Fifteenth positioning acceleration time	0.01 to 360s	5s
1279	Fifteenth positioning deceleration time	0.01 to 360s	5s
1280	Fifteenth positioning dwell time	0 to 20000ms	0ms
1281	Fifteenth positioning sub-function	0, 10, 100, 110	10
1282	Home position return method selection	0 to 6	4
1283	Home position return speed	0 to 30Hz	2Hz
1284	Home position return creep speed	0 to 10Hz	0.5Hz
1285	Home position shift amount lower 4 digits	0 to 9999	0
1286	Home position shift amount upper 4 digits	0 to 9999	0
1287	Travel distance after proximity dog ON lower 4 digits	0 to 9999	2048
1288	Travel distance after proximity dog ON upper 4 digits	0 to 9999	0
1289	Home position return stopper torque	0 to 200%	40%
1290	Home position return stopper waiting time	0 to 10s	0.5s
1292	Position control terminal input selection	0, 1	0
1293	Roll feeding mode selection	0, 1	0
1294	Position detection lower 4 digits	0 to 9999	0
1295	Position detection upper 4 digits	0 to 9999	0
1296	Position detection selection	0 to 2	0
1297	Position detection hysteresis width	0 to 32767	0
1300 to 1343, 1350 to 1359	Communication option parameters		
Pr.CLR	Parameter clear	(0,)1	0
ALL.CL	All parameter clear	(0,)1	0
Err.CL	Fault history clear	(0,)1	0
Pr.CPY	Parameter copy	(0,)1 to 3	0
Pr.CHG	Initial value change list	—	—
IPM	IPM initialization	0, 3003	0
AUTO	Automatic parameter setting	—	—
Pr.Md	Group parameter setting	(0,)1, 2	0

*1 Differs according to capacities.
- 6%: FR-A820-00046(0.4K) to 00077(0.75K) and FR-A840-00023(0.4K) to 00038(0.75K)
- 4%: FR-A820-00105(1.5K) to 00250(3.7K) and FR-A840-00052(1.5K) to 00126(3.7K)
- 3%: FR-A820-00340(5.5K) to 00490(7.5K) and FR-A840-00170(5.5K) to 00250(7.5K)
- 2%: FR-A820-00630(11K) to 03160(55K) and FR-A840-00310(11K) to 01800(55K)
- 1%: FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*2 For FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower

*3 For FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*4 For FR-A820-00490(7.5K) or lower and FR-A840-00250(7.5K) or lower

*5 For FR-A820-00630(11K) or higher and FR-A840-00310(11K) or higher

*6 Differs according to capacities.
- 4%: FR-A820-00490(7.5K) or lower and FR-A840-00250(7.5K) or lower
- 2%: FR-A820-00630(11K) to 03160 (55K) and FR-A840-00310(11K) to 01800 (55K)
- 1%: FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher

*7 Differs according to the voltage class. (200 V class/400 V class)

*8 The setting is available only when the FR-A8AP is mounted.

*9 The parameter number in parentheses is the one for use with the parameter unit (FR-PU07).

*10 Differs according to types. (FM type/CA type)

*11 The setting is available only with the CA type.

*12 The setting value "60" is only available for **Pr.178**, and "61" is only for **Pr.179**.

*13 The setting values "92, 93, 192, 193" are only available for **Pr.190 to Pr.194**.

*14 Simple mode parameters. (Initially set to the extended mode.)

*15 The setting is available only with the 400 V class.

7 TROUBLESHOOTING

When a fault occurs in the inverter, the protective function activates, and the PU display automatically changes to one of the fault or alarm indications on page 24.
If the fault does not correspond to any of the following faults or if you have any other problem, please contact your sales representative.

- Retention of the fault output signal
  Opening the magnetic contactor (MC) provided on the input side of the inverter at a fault occurrence shuts off the control power to the inverter, therefore, the fault output will not be retained.
- Fault or alarm indication
  When a fault or alarm occurs, the operation panel display automatically switches to a fault or alarm indication.
- Resetting method
  When a fault occurs, the inverter output is kept stopped. Unless reset, the inverter cannot restart. (Refer to page 23.)
- When any fault occurs, take an appropriate corrective action, then reset the inverter, and resume the operation. Not doing so may lead to an inverter fault and damage.

Inverter fault or alarm indications are roughly categorized as below.

- Error message
  A message regarding operational fault and setting fault by the operation panel (FR-DU08) and parameter unit (FR-PU07) is displayed. The inverter does not trip.
- Warning
  The inverter does not trip even when a warning is displayed. However, failure to take appropriate measures will lead to a fault.
- Alarm
  The inverter does not trip. An alarm can also be output with a parameter setting.
- Fault
  When a protective function activates, the inverter trips and a fault signal is output.

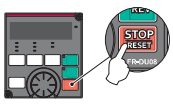
NOTE

- For the details of fault displays and other troubles, also refer to the Instruction Manual (Detailed).
- The past eight faults can be displayed using the setting dial. (Refer to page 16.)

7.1 Reset method for the protective functions

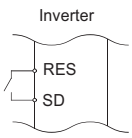
The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter. The inverter recovers about 1s after the reset is released.

- Using the operation panel, press STOP RESET to reset the inverter.
  (This may only be performed when a fault occurs.)



- Switch power OFF once, then switch it ON again.

- Turn ON the reset signal (RES) for 0.1s or more. (If the RES signal is kept ON, "Err" appears (flickers) to indicate that the inverter is in a reset status.)



NOTE

- OFF status of the start signal must be confirmed before resetting an inverter fault. Resetting an inverter fault with the start signal ON restarts the motor suddenly.

7.2 List of fault displays

	Operation panel indication		Name
Error message	E- - - - -	E- - - -	Faults history
	HOLd	HOLD	Operation panel lock
	LOCd	LOCD	Password locked
	Er 1 to Er4 Er8	Er1 to Er4 Er8	Parameter write error
	rE 1 to rE4 rE6 to rE8	rE1 to rE4 rE6 to rE8	Copy operation error
	Err.	Err.	Error
Warning	OL	OL	Stall prevention (overcurrent)
	oL	oL	Stall prevention (overvoltage)
	Rb	RB	Regenerative brake pre-alarm
	TH	TH	Electronic thermal relay function pre-alarm
	PS	PS	PU stop
	MT 1 to MT3	MT1 to MT3	Maintenance signal output
	CP	CP	Parameter copy
	SL	SL	Speed limit indication
	SA	SA	Safety stop
	UF	UF	USB host error
	EV	EV	24 V external power supply operation
	HP 1	HP1	Home position return setting error
	HP2	HP2	Home position return uncompleted
	HP3	HP3	Home position return parameter setting error
Alarm	FN	FN	Fan alarm
Fault	E. OC 1	E.OC1	Overcurrent trip during acceleration
	E. OC2	E.OC2	Overcurrent trip during constant speed
	E. OC3	E.OC3	Overcurrent trip during deceleration or stop
	E. OV 1	E.OV1	Regenerative overvoltage trip during acceleration
	E. OV2	E.OV2	Regenerative overvoltage trip during constant speed
	E. OV3	E.OV3	Regenerative overvoltage trip during deceleration or stop
	E. THT	E.THT	Inverter overload trip (electronic thermal relay function)
	E. THM	E.THM	Motor overload trip (electronic thermal relay function)
	E. FIN	E.FIN	Heatsink overheat
	E. IPF	E.IPF	Instantaneous power failure
	E. UVT	E.UVT	Undervoltage
	E. ILF	E.ILF	Input phase loss

	Operation panel indication		Name
Fault	E. OLT	E.OLT	Stall prevention stop
	E. GF	E.GF	Output side earth (ground) fault overcurrent
	E. SOT	E. SOT	Loss of synchronism detection
	E. LF	E.LF	Output phase loss
	E. OHT	E.OHT	External thermal relay operation
	E. PTC	E.PTC	PTC thermistor operation
	E. OPT	E.OPT	Option fault
	E. OP 1	E.OP1	Communication option fault
	E. 1 to E. 3	E. 1 to E. 3	Option fault
	E. PE	E.PE	Parameter storage device fault
	E. PUE	E.PUE	PU disconnection
	E. RET	E.RET	Retry count excess
	E. PE2	E.PE2	Parameter storage device fault
	E. 5 to E. 7 E. CPU	E. 5 to E. 7 E.CPU	CPU fault
	E. CTE	E.CTE	Operation panel power supply short circuit RS-485 terminals power supply short circuit
	E. P24	E.P24	24 VDC power fault
	E. CdO	E.CDO	Abnormal output current detection
	E. IOH	E.IOH	Inrush current limit circuit fault
	E. SER	E.SER	Communication fault (inverter)
	E. AIE	E.AIE	Analog input fault
	E. OS	E.OS	Overspeed occurrence
	E. OSd	E.OSD	Speed deviation excess detection
	E. ECT	E.ECT	Signal loss detection
	E. Od	E.OD	Excessive position fault
	E. Mb 1 to E. Mb7	E.MB1 to E.MB7	Brake sequence fault
	E. EP	E.EP	Encoder phase fault
	E. bE	E. BE	Brake transistor alarm detection
	E. USb	E. USB	USB communication fault
	E. 11	E.11	Opposite rotation deceleration fault
	E. 13 E. PbT	E.13 E.PBT	Internal circuit fault
	E. SAF	E.SAF	Safety circuit fault
	E. LCI	E.LCI	4 mA input fault
	E. PCH	E.PCH	Pre-charge fault
	E. PId	E.PID	PID signal fault
	E. 16 to E. 20	E.16 to E.20	User definition error by the PLC function

8 SPECIFICATIONS

8.1 Rating

◆ 200 V class

Model FR-A820-[ ]			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA) *2	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A) *3	SLD	4.6 (3.9)	7.7 (6.5)	10.5 (8.9)	16.7 (14.2)	25 (21.3)	34 (28.9)	49 (41.7)	63 (53.6)	77 (65.5)	93 (79.1)	125 (106)	154 (131)	187 (159)	233 (198)	316 (269)	380 (323)	475 (404)
		LD	4.2 (3.6)	7 (6)	9.6 (8.2)	15.2 (12.9)	23 (19.6)	31 (26.4)	45 (38.3)	58 (49.3)	70.5 (59.9)	85 (72.3)	114 (96.9)	140 (119)	170 (145)	212 (180)	288 (245)	346 (294)	432 (367)
		ND (initial setting)	3 (4.5)	5 (7.5)	8 (12)	11 (16.5)	17.5 (26.3)	24 (36)	33 (49.5)	46 (69)	61 (91.5)	76 (114)	90 (135)	115 (173)	145 (218)	175 (263)	215 (323)	288 (432)	346 (519)
		HD	1.5 (4.5)	3 (7.5)	5 (12)	8 (16.5)	11 (26.3)	17.5 (36)	24 (49.5)	33 (69)	46 (91.5)	61 (114)	76 (135)	90 (173)	115 (218)	145 (263)	175 (323)	215 (432)	288 (519)
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
	Rated voltage *5		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in											FR-BU2 (Option)					
		Maximum brake torque*7	150% torque/3%ED *6			100% torque/ 3%ED *6		100% torque/ 2%ED *6		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED					100% torque/6%ED				—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A) *8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA) *9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529) *10			Enclose type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*3 When an operation is performed with the carrier frequency set to 3 kHz or more, and the inverter output current reaches the value indicated in the parenthesis of the rated current, the carries frequency is automatically lowered. The motor noise becomes louder accordingly.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 Value by the built-in brake resistor
*7 Value for the ND rating
*8 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10 FR-DU08: IP40 (except for the PU connector section)

◆ 400 V class

Model FR-A840-[ ]			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output	Rated capacity (kVA) *2	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A) *3	SLD	2.3 (2)	3.8 (3.2)	5.2 (4.4)	8.3 (7.1)	12.6 (10.7)	17 (14.5)	25 (21.3)	31 (26.4)	38 (32.3)	47 (40)	62 (52.7)	77 (65.5)	93 (79.1)	116 (98.6)	180 (153)	216 (184)	260 (221)	325 (276)	361 (307)	432 (367)	481 (409)	547 (465)	610 (519)	683 (581)
		LD	2.1 (1.8)	3.5 (3)	4.8 (4.1)	7.6 (6.5)	11.5 (9.8)	16 (13.6)	23 (19.6)	29 (24.7)	35 (29.8)	43 (36.6)	57 (48.5)	70 (59.5)	85 (72.3)	106 (90.1)	144 (122)	180 (153)	216 (184)	260 (221)	325 (276)	361 (307)	432 (367)	481 (409)	547 (465)	610 (519)
		ND (initial setting)	1.5 (2.3)	2.5 (3.8)	4 (6)	6 (9)	9 (13.5)	12 (18)	17 (25.5)	23 (34.5)	31 (46.5)	38 (57)	44 (66)	57 (85.5)	71 (107)	86 (129)	110 (165)	144 (216)	180 (270)	216 (184)	260 (221)	325 (276)	361 (307)	432 (367)	481 (409)	547 (465)
		HD	0.8 (2.3)	1.5 (3.8)	2.5 (6)	4 (9)	6 (13.5)	9 (18)	12 (25.5)	17 (34.5)	23 (46.5)	31 (57)	38 (66)	44 (85.5)	57 (107)	71 (129)	86 (165)	110 (216)	144 (270)	180 (153)	216 (184)	260 (221)	325 (276)	361 (307)	432 (367)	481 (409)
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
	Rated voltage *5		Three-phase 380 to 500 V																							
	Regenerative braking	Brake transistor	Built-in															FR-BU2(Option)								
		Maximum brake torque *7	100% torque/2%ED *6							20% torque/continuous								10% torque/continuous								
		FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED				— *12				—	—	—	—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz *11																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A) *8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA) *9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529) *10			Enclose type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*3 When an operation is performed with the carrier frequency set to 3 kHz or more, and the inverter output current reaches the value indicated in the parenthesis of the rated current, the carries frequency is automatically lowered. The motor noise becomes louder accordingly.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 Value by the built-in brake resistor
*7 Value for the ND rating
*8 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10 FR-DU08: IP40 (except for the PU connector section)
*11 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**. (For details, refer to the Instruction Manual (Detailed)).
*12 The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

Appendix

Appendix 1 Instructions for compliance with the EU Directives

The EU Directives are issued to standardize different national regulations of the EU Member States and to facilitate free movement of the equipment, whose safety is ensured, in the EU territory.
Since 1996, compliance with the EMC Directive that is one of the EU Directives has been legally required. Since 1997, compliance with the Low Voltage Directive, another EU Directive, has been also legally required. When a manufacturer confirms its equipment to be compliant with the EMC Directive and the Low Voltage Directive, the manufacturer must declare the conformity and affix the CE marking.

- The authorized representative in the EU
  The authorized representative in the EU is shown below.
  Name: Mitsubishi Electric Europe B.V.
  Address: Gothaer Strasse 8, 40880 Ratingen, Germany
- Note
  We declare that this inverter conforms with the EMC Directive in industrial environments and affix the CE marking on the inverter. When using the inverter in a residential area, take appropriate measures and ensure the conformity of the inverter used in the residential area.

◆ EMC Directive

We declare that this inverter conforms with the EMC Directive and affix the CE marking on the inverter.

- EMC Directive: 2004/108/EC
- Standard(s): EN61800-3:2004 (Second environment / PDS Category "C3")
- This inverter is not intended to be used on a low-voltage public network which supplies domestic premises.
- Radio frequency interference is expected if used on such a network.
- The installer shall provide a guide for installation and use, including recommended mitigation devices.

Note:
First environment
Environment including residential buildings. Includes buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.
Second environment
Environment including all buildings except buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.

◆ Note

Set the EMC filter valid and install the inverter and perform wiring according to the following instructions.

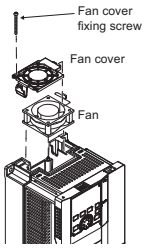
*1 This inverter is equipped with an EMC filter. Enable the EMC filter. (For details, refer to the Instruction Manual (Detailed).)
*2 Connect the inverter to an earthed power supply.
*3 Install a motor and a control cable written in the EMC Installation Manual (BCN-A21041-204) according to the instruction.
*4 The cable length between the inverter and the motor is 5 m (16.4 feet) maximum.
*5 Confirm that the inverter conforms with the EMC Directive as the industrial drives application for final installation.

◆ Low Voltage Directive

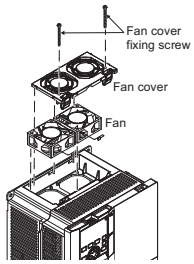
We have self-confirmed our inverters as products compliant to the Low Voltage Directive (Conforming standard EN 61800-5-1) and affix the CE marking on the inverters.

◆ Outline of instructions

*1 Do not use an earth leakage current breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth securely.
*2 Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)
*3 Use the cable sizes on page 8 under the following conditions.
• Surrounding air temperature: 40°C (104°F) maximum
If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.
*4 Use a tinned (plating should not include zinc) crimping terminal to connect the earth (ground) cable. When tightening the screw, be careful not to damage the threads. For use as a product compliant with the Low Voltage Directive, use PVC cable whose size is indicated on page 8.
*5 Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.
*6 This product can cause a d.c. current in the protective earthing conductor. Where a residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of Type B is allowed on the supply side of this product.
*7 Use the inverter under the conditions of overvoltage category II (usable regardless of the earth (ground) condition of the power supply), overvoltage category III (usable with the earthed-neutral system power supply, 400 V class only) and pollution degree 2 or lower specified in IEC664. An insulating transformer needs to be installed in the input side of the FR-A820 series inverters.
• To use the inverter of FR-A820-01540(30K) or higher and FR-A840-00770(30K) or higher (IP00) under the conditions of pollution degree 2, install it in the enclosure of IP 2X or higher.
• To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.
• To use the inverter of FR-A820-01250(22K) or lower and FR-A840-00620(22K) or lower (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



FR-A820-00105(1.5K) to 00250(3.7K)
FR-A840-00083(2.2K), 00126(3.7K)



FR-A820-00340(5.5K) to 00250(22K)
FR-A840-00170(5.5K) to 00620(22K)

*8 On the input and output of the inverter, use cables of the type and size set forth in EN60204 Appendix C.
*9 The operating capacity of the relay outputs (terminal symbols A1, B1, C1, A2, B2, C2) should be 30VDC, 0.3A. (Relay output has basic isolation from the inverter internal circuit.)
*10 Control circuit terminals on page 5 are safely isolated from the main circuit.
*11 Environment (For the detail, refer to the Instruction Manual (Detailed).)

	During Operation	In Storage	During Transportation
Surrounding air temperature	LD, ND (initial setting), HD: -10 to +50°C (14 to 122°F) SLD: -10 to +40°C (14 to 104°F)	-20 to +65°C (-4 to +149°F)	-20 to +65°C (-4 to +149°F)
Ambient humidity	95% RH or less	95% RH or less	95% RH or less
Maximum altitude	2500m (8202 feet)	2500m (8202 feet)	10000m (32808 feet)

◆ Wiring protection

Class T, Class J, Class CC fuse, or UL 489 Molded Case Circuit Breaker (MCCB) must be provided.T or UL 489 Molded Case Circuit Breaker (MCCB) must be provided.

FR-A820-[]		00046 (0.4K)	00077 (0.75K)	00105 (1.5K)	00167 (2.2K)	00250 (3.7K)	00340 (5.5K)	00490 (7.5K)	00630 (11K)	00770 (15K)
Rated fuse voltage(V)		240V or more								
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	15	20	30	40	60	80	150	175	200
	With power factor improving reactor	15	20	20	30	50	70	125	150	200
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		15	15	25	40	60	80	110	150	190

FR-A820-[]		00930 (18.5K)	01250 (22K)	01540 (30K)	01870 (37K)	02330 (45K)	03160 (55K)	03800 (75K)	04750 (90K)
Rated fuse voltage(V)		240V or more							
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	225	300	350	400	500	500	—	—
	With power factor improving reactor	200	250	300	350	400	500	600	700
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		225	300	350	450	500	700	900	1000

FR-A840-[]		00023 (0.4K)	00038 (0.75K)	00052 (1.5K)	00083 (2.2K)	00126 (3.7K)	00170 (5.5K)	00250 (7.5K)	00310 (11K)	00380 (15K)	00470 (18.5K)	00620 (22K)	00770 (30K)
Rated fuse voltage(V)		500V or more											
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	6	10	15	20	30	40	70	80	90	110	150	175
	With power factor improving reactor	6	10	10	15	25	35	60	70	90	100	125	150
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		15	15	15	20	30	40	60	70	90	100	150	175

FR-A840-[]		00930 (37K)	01160 (45K)	01800 (55K)	02160 (75K)	02600 (90K)	03250 (110K)	03610 (132K)	04320 (160K)	04810 (185K)	05470 (220K)	06100 (250K)	06830 (280K)
Rated fuse voltage(V)		500V or more											
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	200	250	300	—	—	—	—	—	—	—	—	—
	With power factor improving reactor	175	200	250	300	350	400	500	600	700	800	900	1000
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		225	250	450	450	500	600	800	900	1000	1200	1200	1200

*1 Maximum allowable rating by US National Electrical Code. Exact size must be chosen for each installation.

◆ Short circuit ratings

- 200 V class

Suitable For Use in A Circuit Capable of Delivering Not More Than 100 kA rms Symmetrical Amperes, 264 V Maximum.

- 400 V class

Suitable For Use in A Circuit Capable of Delivering Not More Than 100 kA rms Symmetrical Amperes, 550 V or 600 V Maximum.

Appendix 2 Instructions for UL and cUL

(Standard to comply with: UL 508C, CSA C22.2 No.14)

◆ General precaution

CAUTION - Risk of Electric Shock -
The bus capacitor discharge time is 10 minutes. Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for residual voltage between terminal P/+ and N/- with a meter etc., to avoid a hazard of electrical shock.
ATTENTION - Risque de choc électrique -
La durée de décharge du condensateur de bus est de 10 minutes. Avant de commencer le câblage ou l'inspection, mettez l'appareil hors tension et attendez plus de 10 minutes.

◆ Installation

The below types of inverter have been approved as products for use in enclosure and approval tests were conducted under the following conditions.
Design the enclosure so that the surrounding air temperature, humidity and ambience of the inverter will satisfy the above specifications. (Refer to .)

◆ Wiring protection

For installation in the United States, Class T, Class J, or Class CC fuse, or UL 489 Molded Case Circuit Breaker (MCCB) must be provided, in accordance with the National Electrical Code and any applicable local codes.
For installation in Canada, Class T, Class J, or Class CC fuse, or UL 489 Molded Case Circuit Breaker (MCCB) must be provided, in accordance with the Canadian Electrical Code and any applicable local codes.

FR-A820-[]		00046 (0.4K)	00077 (0.75K)	00105 (1.5K)	00167 (2.2K)	00250 (3.7K)	00340 (5.5K)	00490 (7.5K)	00630 (11K)	00770 (15K)
Rated fuse voltage(V)		240V or more								
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	15	20	30	40	60	80	150	175	200
	With power factor improving reactor	15	20	20	30	50	70	125	150	200
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		15	15	25	40	60	80	110	150	190

FR-A820-[]		00930 (18.5K)	01250 (22K)	01540 (30K)	01870 (37K)	02330 (45K)	03160 (55K)	03800 (75K)	04750 (90K)
Rated fuse voltage(V)		240V or more							
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	225	300	350	400	500	500	—	—
	With power factor improving reactor	200	250	300	350	400	500	600	700
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		225	300	350	450	500	700	900	1000

FR-A840-[]		00023 (0.4K)	00038 (0.75K)	00052 (1.5K)	00083 (2.2K)	00126 (3.7K)	00170 (5.5K)	00250 (7.5K)	00310 (11K)	00380 (15K)	00470 (18.5K)	00620 (22K)	00770 (30K)
Rated fuse voltage(V)		500V or more											
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	6	10	15	20	30	40	70	80	90	110	150	175
	With power factor improving reactor	6	10	10	15	25	35	60	70	90	100	125	150
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		15	15	15	20	30	40	60	70	90	100	150	175

FR-A840-[]		00930 (37K)	01160 (45K)	01800 (55K)	02160 (75K)	02600 (90K)	03250 (110K)	03610 (132K)	04320 (160K)	04810 (185K)	05470 (220K)	06100 (250K)	06830 (280K)
Rated fuse voltage(V)		500V or more											
Fuse Maximum allowable rating (A) *1	Without power factor improving reactor	200	250	300	—	—	—	—	—	—	—	—	—
	With power factor improving reactor	175	200	250	300	350	400	500	600	700	800	900	1000
Molded case circuit breaker (MCCB) Maximum allowable rating (A) *1		225	250	450	450	500	600	800	900	1000	1200	1200	1200

*1 Maximum allowable rating by the US National Electrical Code. Exact size must be chosen for each installation.

◆ Wiring to the power supply and the motor

For wiring the input (R/L1, S/L2, T/L3) and output (U, V, W) terminals of the inverter, use the UL listed copper, stranded wires (rated at 75°C) and round crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.

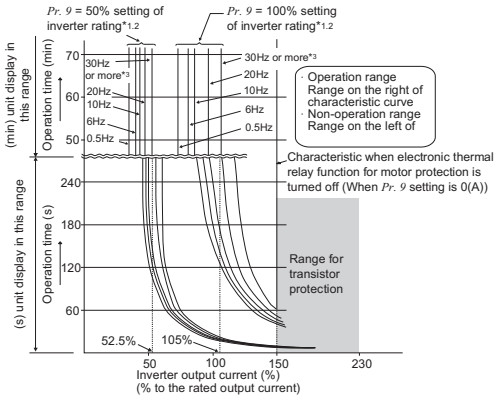
◆ Short circuit ratings

- 200 V class
  Suitable For Use in A Circuit Capable of Delivering Not More Than 100 kA rms Symmetrical Amperes, 264 V Maximum.
- 400 V class
  Suitable For Use in A Circuit Capable of Delivering Not More Than 100 kA rms Symmetrical Amperes, 550 V or 600 V Maximum.

◆ Motor overload protection

When using the electronic thermal relay function as motor overload protection, set the rated motor current in **Pr.9 Electronic thermal O/L relay**.

Operation characteristics of electronic thermal relay function



This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output. (The operation characteristic is shown on the left.)

- When using the Mitsubishi constant-torque motor

(1) Set one of "1", "13" to "16", "50", "53", "54" in **Pr.71**. (This provides a 100% continuous torque characteristic in the low-speed range.)

(2) Set the rated current of the motor in **Pr.9**.

*1 When a value 50% of the inverter rated output current (current value) is set in **Pr.9**

*2 The % value denotes the percentage to the rated inverter current. It is not the percentage to the rated motor current.

*3 When you set the electronic thermal relay function dedicated to the Mitsubishi constant-torque motor, this characteristic curve applies to operation at 6 Hz or higher.

NOTE

- The internal accumulated heat value of the electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-OFF.
- When multiple motors are driven with a single inverter or when a multi-pole motor or a special motor is driven, install an external thermal relay (OCR) between the inverter and motors. Note that the current indicated on the motor rating plate is affected by the line-to-line leakage current (details in the Instruction Manual (Detailed)) when selecting the setting for an external thermal relay.
  The cooling effect of the motor drops during low-speed operation. Use a thermal protector or a motor with built-in thermistor.
- When the difference between the inverter and motor capacities is large and the setting is small, the protective characteristics of the electronic thermal relay function will be deteriorated. In this case, use an external thermal relay.
- A special motor cannot be protected by the electronic thermal relay function. Use an external thermal relay.
- Set **Pr.9** = "0" for vector-control-dedicated motors (SF-V5RU) because they are equipped with thermal protectors.
- Electronic thermal relay may not operate when 5% or less of rated inverter current is set to electronic thermal relay setting.
- Motor over temperature sensing is not provided by the drive.

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■ When playing the enclosed CD-ROM on Windows OS

♦ Operating environment
- The following system is required to read instruction manuals contained in the enclosed CD-ROM.

Item	Specifications
OS	Microsoft Windows XP Professional or Home Edition, Windows XP Tablet PC Edition, Windows vista, Windows 7, Windows 8
CPU	Intel Pentium or better processor
Memory	128MB of RAM
Hard disk	90MB of available hard-disk space
CD-ROM drive	Double speed or more (more than quadruple speed is recommended)
Monitor	800x600 dot or more
Application	Adobe Reader 7.0 or more Internet Explorer 6.0 or more

♦ Operating method of the enclosed CD-ROM

How to read instruction manuals
Step 1. Start Windows and place the enclosed CD-ROM in the CD-ROM drive.
Step 2. The main window automatically opens by the web browser.
Step 3. Choose your language by a language choice menu of the page left edge.
Step 4. Click a manual you want to read in the "INSTRUCTION MANUAL" list.
Step 5. PDF manual you clicked opens.

* Manual opening of the enclosed CD-ROM
Step 1. Start Windows and place the enclosed CD-ROM in the CD-ROM drive.
Step 2. Select a CD-ROM drive (example: D drive) of "My computer" and click the right mouse button. Then, click "open" in the context menu.
Step 3. Open "index.html" in the opened folder.
Step 4. The main window opens by the web browser. Operates according to the steps from "Step 3" of "How to read instruction manuals"

- PDF data of the instruction manual are stored in "MANUAL" folder on the enclosed CD-ROM.

MEMO

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
May 2013	IB-0600493-A	First edition
Nov 2013	IB-0600493-B	Addition • FR-A840-03250(110K) to 06830(280K)

⚠ For Maximum Safety

- Mitsubishi inverters are not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to prevent serious accidents when it is used in facilities where breakdowns of the product are likely to cause a serious accident.
- Please do not use this product for loads other than three-phase induction motors.